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AVIATION DIGEST

MISSION RELEASE PAGE 11

UNITED STATES ARMY AVIATION DIGEST

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Cover sketches from Vietnam are courtesy of Mr. Howard Brodie and the Associated Press.

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

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LETTERS

Sir:

I have read with considerable interest the thought provoking article, "Aviation Career Course?" in your August 1966 issue. While it does not necessarily reflect my views, it is extremely well written and certainly justifies the recognition you gave it by citation as the Monthly Winner in your Annual Award contest.

Action is now being taken at this headquarters regarding Army Aviation Command and Staff Course instruction and significant changes are expected by the beginning of FY 1968.

Please convey my congratulations to the authors for an outstanding job of professional writing.

BG FRANK MESZAR
Asst Deputy Chief of Staff
for Individual Training
HQ, U. S. Continental
Army Command
Fort Monroe, Va. 23351

Sir:

There seems to be two schools of thought on AR 672-5-1, Change 11, pertaining to the Aircraft Crewman Badges. Personnel states that to receive the permanent Master Aircraft Crewman Badge, an individual must be on flight status for a period of 15 years. The May 1966 issue of Aviation Digest reads that if you have been "crewchief, flight engineer, or as non-crewmembers in the case of observers, medical aidmen, gunners, aircraft maintenance supervisors, or technical inspectors" for a period of 15 years, one is eligible.

In my particular case I entered Army aviation in August 1948 and since May 1951 have held one of these positions. Total flight status for pay purposes during this period totals approximately 6 years. As we know in Army aviation, even though an individual may hold one of the above mentioned positions, it has not always been possible to draw flight pay.

Would appreciate any information that would make Change 11 more clear for personnel in aviation.

SFC GEORGE H. ECKER
Aviation Support Division
ARSEC, Box 11
APO San Francisco 96263

• *Your letter is not the only one we have received on the Aircraft Crewman Badge. We asked the Department of the Army Awards Branch for clarification and this is what they said:*

"To qualify for award of either of the aircraft crewman badges, an individual would have to be on flight status, physically qualified, and serving in one or more of the principal duty assignments indicated during the period for which recommended. However, if an individual is school trained for one of the principal duties listed in paragraph 108.5a, AR 672-5-1, as changed, he is authorized to wear the aircraft crewman's badge permanently. He does not necessarily have to be on flight status at time of the award under the provisions of this paragraph.

"Anyone who at one time, subsequent to 1 Jan 47, has met eligibility requirements may be awarded the aircraft crewman's badge whether he is presently serving in an enlisted, warrant officer, or commissioned status.

"Award is restricted to duty positions cited in paragraph 108.3, 108.4, and 108.5, AR 672-5-1, as changed.

"It is suggested by Department of the Army Awards Branch that in cases where verification of flying status is unavailable that the Enlisted Personnel Center, Fort Benjamin Harrison, Ind., be contacted for verification. It was also stated that if discretion is used, affidavits may be accepted as proof of flying status."—Ed

Sir:

I have heard and read much ado lately about the designing of a Combat Aviator's Badge. Fiddlesticks! What are service ribbons for? The glory happy boys are apparently trying to horn in on the esteem of the Combat Infantryman and there is only one way to do that . . . be one. La te da! What a laugh the boys in both shades of blue would get. They've been flying that way for soooooooo many years now. Not only do I say no, I say hell no! If something of that nature is approved I suggest that wings be designed to recognize those who haven't been in combat. The majority of Army Aviators have been and very few won't have been by the time they terminate service. This reverse measure would be much cheaper to the majority.

MAJ STEPHEN FARISH
Walnut Court
Ozark, Ala. 36360

Sir:

This command has, for the first time, received a copy of your outstanding publication, "United States Army Aviation Digest." It has been read by all hands and acclaimed as a fine example of flight safety and maintenance information directly related to helicopter flying and the combat experience gained therefrom.

Helicopter Combat Support Squadron 1 is presently engaged in many diverse activities in the Pacific Fleet, all of which are in direct support of military operations in and around Vietnam. Pilots of this command are presently undergoing familiarization and transition training in the UH-1B helicopter. This training, together with the aircraft necessary to conduct it, is being provided by the United States Army. Your magazine clearly reflects the nature of activities that this squadron engages in and contains articles of primary interest to all HC-1 pilots.

It would be deeply appreciated if this command could be added to your distribution list. It is requested that eight copies be made available allowing distribution from the home squadron to all SAR detachments in the Southeast Asian theater of operations.

W. F. QUARG
CO, Helicopter Support Squadron 1
NAAS Ream Field
Imperial Beach, Calif. 92032

• *You're on mate! Instructions for obtaining the Digest winging westward.—Ed*

Sir:

Enjoyed reading your article, "Corrosion Is An Ugly Word," by Huey L. Brannon on pages 10-14 of June 66. U.S. Army Aviation Digest. It was interesting and enlarged my knowledge of different types of corrosion. I would like to make a correction concerning the corrosion control and treatment manual for aircraft, TM 1-1-1A-20, which the author refers to on page 14. The author should have referred to TM 1-1-1A-10 listed in DA Pam 310-4, page 6, dated 25 May 65. The Army at present, however, does not have a manual on corrosion. DA Cir 310-12, dated 23 May 66, page 5, rescinded this publication.

Thanks for publishing such a good aviation magazine.

SP6 WILLIAM W. LEE
138th Transportation Detachment
APO San Francisco 96291

• *You're absolutely right—thanks for the watchful eye.—Ed.*

A Purple Heart!

Major Red Raider

"IT'S THE USUAL. We ride shotgun for four slicks. There'll be two LZs this time with two landings on each. Same early time tomorrow. Same formation. Here's the operation order with details. Read 'em this time.

"And while we're at it, I'd like to warn you about those late card games. Riding shotgun is no picnic no matter how hot a flier you think you are. Tonight I want you to get to bed early and get some sleep. For once I'd like to see what you can do when you're not tired before you start."

It was the Old Man talking. Today was one of those rare ones when we didn't fly. After being out every day for the past week the little rest was welcome.

But tomorrow we would be back in harness again. A battalion of infantry was to go into a heavily infested Viet Cong area. The initial unit would be brought in by troop-carrying helicopters or slicks as we preferred to call them.

There were to be four lifts of troops. Two were to be on one landing zone and two on another about a mile away. Between these two, the troops hoped to bottle up a sizable catch of Viet Cong.

Plans called for our armed platoon of helicopters to "marry up" with the troop-carrying helicopters at a nearby staging area. We would then fly with them to the landing zone and try to keep the Viet Cong in their holes during the landing.

The next morning things turned out just about like the Old Man said it would—samo, samo. But in his sleep decree he was wrong. I went to bed early but in the morning I still had that half awake feeling. A look at the others showed they felt the same way.

In spite of my reluctance to wake up, things moved right along. Before I knew it I had finished my morning necessities and was on the way to the mess hall. Breakfast was extra good—the eggs cooked just right, ham fried to perfection.

In spite of the good food, I can't say I enjoyed it. The extra vittles and the care taken by the cooks to prepare them reminded me of the condemned man's last meal.

With breakfast over, I went outside and counted off my crew. In the jeep on the way to the flight line none of us talked much. I guess I could pass our silence off by saying we were all sleepy, but this is not true. The damp chill of the early morning air in Vietnam soon wakes you up, especially if you are riding in an open jeep. It was just that we were headed for a long dangerous day and all of us were thinking about it.

On the flight line we went through the same familiar routine of the early morning briefing to work into the operation order the last minute changes. We were given the same call signs and the same warnings by the safety officer.

As soon as my aircraft was assigned I made my last minute preflight and we took off to the staging area to meet the slicks. We had hardly landed before it was "thumbs up" with all troops loaded.

The first lift into the landing zone went off without a hitch. "Charlie" didn't seem to be anywhere around, or at least he didn't let on that he was. All of us breathed a sigh of relief.

The second landing into LZ 1 seemed to be even quieter than the first. Another sigh of relief went along the line.

But when we moved into LZ 2

MAJ Raider is an active duty Army Aviator who does not wish his name used.

The Huey was burning, but the gunships opened up

it was a different story. The Air Force's A-1E Skyraiders had just finished their work when we moved in to take up the fire. It's important in an operation like this that you don't let up fire until the very last second. This keeps the enemy pinned down. But fire must be lifted before the troops land or they might get hit. When we pulled away it was only a second before the first slick went into the LZ.

Then it happened. With no firing on them, the Viet Cong came out of their holes and started firing on the leading troop-carrying helicopter. The pilot yelled on the phone that the fire was heavy and that he was in trouble. From where I was it looked about as heavy as I have ever seen. The lead ship went in on its side, burning. Another slick reported a hit and it also went down.

One of the gun ships from my platoon came in and started firing on the Viet Cong to draw fire away from the slicks. The pilot flew between the Viet Cong and the slicks and was immediately hit. He yelled that one of his crew was injured and that all the instruments in his helicopter were out. He didn't know what was wrong with his ship but felt it best to go in the LZ where help was available rather than risk a crash in the Viet Cong woods.

The few seconds that it took for all this to happen gave me the chance to size up the situation. I broke to the side where the heaviest fire was coming from and started unloading "old hog" on Charlie.

My fire and fire from the other gun ships gave the slicks the chance they needed to get out of the LZ. My job, of course, was to escort them, and this I had to do even though one of my own was down. But I'll have to admit it was hard to fly off and leave the crew there. The best I could do was to listen in to the medical evacuation helicopters as they went about their business of picking up the wounded.

As soon as the slicks were at a safe altitude I headed back to the LZ. On the way I heard the med evacs reporting that they were loaded with wounded from the other two downed aircraft and couldn't help the gun crew for the moment. Since I was nearer than any of the others, I decided to go in and try to get the crew of the downed gun ship out myself.

There was one problem, though. I still had half a load of ammunition and this extra baggage would limit the number of passengers I could carry. The best thing I could think of was to dump it and the best place to dump it was right on top of old Charlie.

So I went back in over the treeline and gave Charlie my little present. This took only a few minutes. It's surprising how quick you can get rid of your ammunition when you are not conserving every round.

In spite of all my fire Charlie still had plenty of fire of his own and now he concentrated on me. Little pink fireballs kept flying across my nose.

There was a funny noise, like a splat. I had been hit!

It's a funny thing about these little fireballs. When you are on the receiving end, you can see tracers no matter how bright the sun is shining.

As I went in for a landing my subconscious mind was working overtime with all sorts of crazy things going through it. One was that I kept thinking of rain. Of course it wasn't raining; the sun was shining brighter than usual.

Now, after it's all over, I realize that both my door gunners were spewing out lead at the Viet Cong. The empty brass from the left gunner kept hitting my helmet like hard rain and this caused the train of thought.

I came into a flare and decelerated right next to the downed ship. From where I was it looked to be in good shape but of course you couldn't really tell. I kept thinking what a good job the pilot did in bringing it in and if he and his crew could just hold on for a few more minutes I'd have them out of here. The firing was making so much noise I couldn't tell whether it was from my gunners, Charlie, or both.

Suddenly there was a funny noise—sort of like a "splat"—and my hand was jerked from the cyclic. It had a dull pain like I had hit my finger with a hammer. And I reacted that way by shaking it and almost trying to put it in my mouth.

All of this thought activity must have occurred in a split second because before I could even look down another thought crossed my mind. **My hand jerked from the cyclic because I had been hit.**

At that instant, my training took over. Quickly I pulled pitch, locked my knee under it and grabbed cyclic left handed. Our unit SOP required us to fly with force trim on, which probably saved the day. A loose cyclic would have caused us to crash.

With my left hand I pulled out of there. The sudden movement out alerted the rest of the crew. The copilot, after the initial shock of seeing the mess my bleeding arm had made, took over. He flew the helicopter back into the LZ and did a good job of getting the downed crew out. Unfortunately, the wounded man was already dead. The crippled ship proved to have only minor damages, the worst of which was that the instruments were all out. It was later flown out of the area safely.

During the rescue one of the door gunners kept firing on the Viet Cong to keep them pinned down and the other exercised his training in first aid by putting a tourniquet and some dressing on my arm. By this time I was so nervous and jumpy I doubt if I could have done the job by myself.

Later, in the hospital, I was asked what I thought as I looked down at my shattered arm for the first time. Perhaps everyone has thoughts at this time. Mine sounds rather foolish. I said to myself, "Well, it looks like you have a purple heart."

The door gunner dressed the wound

LEBER'S CIGARETTE

LIEUTENANT LEBER glanced at his watch as he shut down his OH-13. "Ah!" he said to himself, "just in time to have a good lunch before going to the office."

Lowering himself to the ground he patted the bubble of the little helicopter affectionately. It was a good machine—flew smoothly, handled well, and, best of all, had soft seats which helped the lieutenant's occupational disease. The OH-13 had once been a VIP bird, and extra sponge rubber had been added to the seats to increase passenger comfort.

In an hour he was at his desk. A few minutes later the Old Man passed his office door and in his usual pleasant manner said, "Lieutenant, come into my office."

As Lieutenant Leber went in he realized that something was wrong.

"Lieutenant," the Old Man barked, "what are the rules about smoking in a helicopter?"

"About the same as ever, sir. I don't think they have been changed."

"That's not what I asked you. I asked you what they are. I'm trying to find out if you know."

"Well, sir, smoking is allowed in level flights only. On the ground there's no smoking within 50 feet of an aircraft. Nor is smoking allowed in an aircraft when taxiing, taking off, climbing, descending, or landing."

"After you have finished smoking, what do you do with the cigarette?"

"Sir, I don't understand what . . ."

"Just answer my question, Lieutenant. You're in trouble enough already."

"Ash trays are provided in the aircraft. All butts are to be snuffed dead out and placed in these. Under no circumstances is any butt to be dropped on the floor or thrown over the side."

"And what should I do with a pilot who allows a butt to fall on a seat and catch the aircraft on fire?"

"Sir, if you will . . ."

"Don't interrupt. You, of all people, should know that smoking in a helicopter is a privilege, not a right. The Army doesn't have to allow it.

"Sir, if you will only tell me what is wrong."

"That Sioux you just brought in caught fire, and it looks like your cigarette caused it."

"But sir, I don't smoke."

"You don't? Well then it was your passenger, and you're responsible for what he does."

"But that was Colonel Bond and you know he's a health bug. Doesn't smoke or drink. Besides, I dropped him off at 1000 this morning. Any cigarette would have done its damage long before I got back."

"Well, it was somebody."

"Perhaps someone passing by the helicopter threw a cigarette in after I left it."

"No, it was lunchtime, and the guard said no one was on the field except Pete Muzak. He doesn't smoke either."

"Colonel, let me see what I can find out about this. There must be something else."

"All right, but I hope for your sake it was something else. We've had a perfect safety record up to

now and I intend to keep it that way."

Lieutenant Leber walked out to the parking ramp. The little helicopter was sitting right where he had left it. It was not damaged in any way, but the soft seat that Leber had admired so much was missing.

He went over to the hangar and found Pete Muzak counting the tools in his toolbox.

"Pete, what happened?"

"Well, sir, after you left I put the ground wheels on the helicopter and tied it down. I was about to leave when I noticed the bubble was filling with smoke. I grabbed a fire extinguisher but found only the sponge rubber seat on fire. I took the seat out and doused it in some water. After a while I took it back out of the water and the fool thing started burning again."

"Where is it now?"

"Still in the water."

Pete got up and led Leber to a bucket. The seat was on top of the bucket with one corner sticking in the water. Pete took the seat out of the water, and sure enough there was a hole about the size of his fist. This time the rubber seat didn't catch fire again.

Leber took the seat and examined the burned spot closely. He lifted the first layer of upholstery—a thin sheet of imitation leather. A 5/8 inch layer of white foam rubber was under this, and directly over some mohair was a 1/4 inch layer of yellow foam rubber.

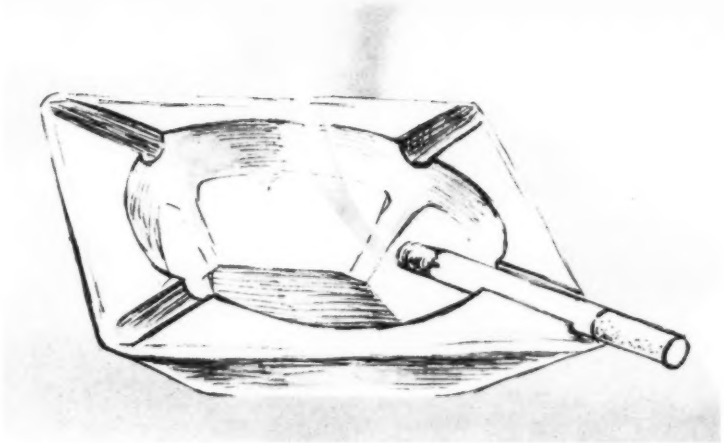
"See anything, Lieutenant?"

"Well something burned it, that's for sure. And if I didn't know better, I'd say it was a cigarette."

After a few minutes of thought he asked, "Was there any welding going on?"

"No, sir."

"Have you checked the helicopter for loose wires? It might have been caused by an electrical fire."



"Couldn't find anything. I'd bet my life that thing's as good as new. Not a thing wrong with it."

"Hmmm! Guess you had better put this back in the water just to make sure it doesn't ignite. You go ahead with your work."

Going over the little machine, Leber started poking his nose in every crack and crevice. He looked at electric wires, fuel lines and oil tanks. After the engine had been given a good going over, he started on the cabin. He examined all the switches but there was no sign that any had overheated. He examined the ash trays but they were clean. He looked at the cabin floor but no cigarette ashes were there. Then something caught his eye. He looked up at the bubble and grunted.

Quickly he went around to the tail, pulled down on it and with the aid of the ground wheels turned the helicopter into the sun a little. Going back to the cabin he looked at the spot where the seat had been. Apparently not satisfied he went back to the tail and moved the helicopter a little more. This time he seemed satisfied.

"Pete!" he yelled.

Pete Muzak stuck his head out of the hangar door.

"Go ask the colonel if he has time to come see something. Tell him it's about the Sioux fire."

In a surprisingly short time, the colonel appeared.

"Look at that," Leber said pointing inside the cabin.

The colonel looked inside. Lieutenant Leber had laid a piece of paper on the metal bucket where the seat had been. A bright spot of light like that made by a magnifying glass was on the paper.

As the colonel watched the paper slowly turned brown and started smoking. A deformity in the bubble was causing a concentration of the hot sunlight on the paper.

"So that's how it started. Better send this in to USABAAR and get a new bubble on this thing."

With a sigh, Lieutenant Leber said, "May I suggest new seats?"

"Why?"

"This helicopter was once a VIP job. To make the seats more comfortable, they glued a layer of foam rubber on top of the standard rubber. This new rubber is not as safe as the regular type. In addition to new seats, I also suggest that in the future proper materials be used when upholstering VIP machines."

Tactical Instrument Ticket

Lieutenant Colonel Edwin O. Carr

VIRTUALLY EVERY helicopter qualified aviator graduating from the Army Aviation School at Fort Rucker will be qualified to fly under actual instrument conditions. Recent events should make it pretty obvious to everyone that the Army's everyday flying machine is the helicopter. Although still somewhat less stable than fixed wing aircraft, the almost daily technological breakthroughs have made rotary wing instrument flight feasible and practical.

The slower cruising speed of the helicopter has tended to discourage its use on airways in the United States. As a matter of fact, when you think about it, an 80 knot machine, at altitude, on airways in the midst of 300-500 knot traffic can give an ATC controller an interesting problem, and usually does.

Be that as it may, helicopter airway instrument flight has become commonplace in the Fort Rucker area and in places such as Europe where the distances covered are relatively short (usually under 100 miles) and alternate airports are plentiful. The technique, difficult but possible, is something like juggling. It requires a high degree of skill but the practical value is questionable. The FAA airways system was designed for fixed wing aircraft as were the attendant approaches. Therefore it is not surprising to find that the most efficient way to get from point A to point B in the United States during bad weather is the fixed wing airplane.

Why not devise a method whereby the slow speed, great maneuverability and general characteristics of the rotary wing machine become an advantage under instrument conditions rather than a liability as they are now? Let us, for a moment, consider each of these characteristics and how they can best be used to our greatest benefit.

Present instrument approaches are based on the 2½° to 3½° glide slope normally associated with fixed wing airplanes. Since the craft is relatively close to the ground for quite a distance on final approach to the point of touchdown, the obstruction clearance requirements must necessarily apply for the same distance plus a buffer. Steepening the approach angle would minimize these requirements. Since rotary wing approaches under VFR conditions are usually made at 6° to 8°, with 20° well within the machine's capability, it appears reasonable to make helicopter instrument approaches within this criterion.

Radar of course is the best way to control the glide path using present equipment. Several trial runs at 6°, 8°, and 12° have shown the steep instrument approach to be quite practical. The time in the "deadman's curve" is minimal and is actually less than under VFR conditions. Airspeed must be reduced or else the rate of descent is apt to become excessive with the accompanying "oops!" at the bottom.

A table showing what has been found to be most effective is shown below. It is based on theoretical rates of descent and is simplified by assuming a no wind condition in order for airspeed and groundspeed to be the same. You will notice that at 12° the airspeed must be considerably reduced. At this angle if the pilot allows himself to get above the glide path a virtual autorotation is necessary to get back on.

ANGLE OF APPROACH	AIR/GROUND SPEED	RATE OF DESCENT
6°	60 kt	636 fpm
8°	50 kt	704 fpm
12°	40 kt	840 fpm

(In spite of certain limitations the 8° approach seems to be the best mousetrap on the market. I have tried these approaches in the TH-13T, the UH-1A tanker and the CH-47 and found them quite satisfactory. Directional control at the lower airspeeds did not present any problems.)

Increased angles of approach could be used with both tactical and conventional ADF. However, the accuracy of presently installed equipment does not seem to warrant increasing the approach angle at this time, since position cannot be fixed with sufficient accuracy to gain any advantage. As new and better airborne and ground equipment is introduced another look into this area would be appropriate.

The Tactical (figure eight) ADF approach (see Aviation Digest, Nov 1965) has the advantage of frequent fixing of position over the beacon as well as staying within a 2,000 by 4,000 meter buffer zone. It is predicated on setting up an approach in a minimum amount of time using equipment presently available and being issued to units in the field. It requires a high degree of skill and proficiency (a requirement applicable to all instrument flying regardless of type).

Slowing to 40 knots on short final coupled with extreme maneuverability, using the copilot to look for the ground, ready to take the controls and land the aircraft, all tend to give the helicopter a distinct advantage in this type of instrument approach. Approved minimums are 200 feet of ceiling and 1/2 mile visibility for the tactical ADF and 100 feet of ceiling and 1/4 mile visibility for the GCA. Details are clearly spelled out in the new AR 95-63 published in February 1966.

Let's take a minute and look at who is being trained to fly tactical instruments and how he is being qualified. Personnel who receive this training come from two sources. One source is the initial input aviator who has received primary helicopter training at Fort Wolters and then goes to Fort Rucker for contact, instrument and tactical instruction. The other is the fixed wing aviator who is receiving helicopter qualification training.

An initial input Army Aviator (ORWAC/WORWAC) receives a total of 50 flight hours of instrument training plus 20 hours of synthetic trainer instruction. This is accomplished in 8 weeks. The first 25 hours of his instrument

COL Carr is Division Commander, Advanced Instrument Flight Division, Department of Rotary Wing Training, USAAVNS, Ft Rucker, Ala.

Tactical Instrument Ticket

flight qualification are devoted to basic instrument flying with emergency panel added. He learns to do much more than just stay right side up. On his basic instrument checkride he must fly within the same tolerances as the standard card holder. In the next 25 hour block of instruction he is taught instrument flight procedures for both ATC and FOC as well as standard and tactical ADF approaches.

The only instruction lacking is VOR and ILS. He must at the conclusion of his training demonstrate the same high proficiency as the FAA type instrument card holder less ILS and VOR. Here it should become apparent that with very little additional training, when he reaches his first stateside unit of assignment, he could obtain a standard card. It would be impractical to give him this training now since he is, in 95 percent of the cases going through Fort Rucker at this time, destined to go to Vietnam where his instrument flying will possibly all be of a tactical nature.

The fixed wing aviator receiving helicopter qualification training will get somewhere between 18 and 25 hours of instrument training. Since he is already fixed wing instrument rated this should be quite adequate. Individuals tend to differ vastly in this respect. Time and experience will ultimately make the final determination. In this case too, the instrument card will be the pink tactical instrument ticket. We should already be knowledgeable on ILS and VOR so the additional technique could be mastered in a very short time after graduation and an FAA type card easily obtained through his unit instrument examiner.

A tactical instrument ticket is a limited ticket. It is not a substandard ticket. The standards remain high because they were established to be high. There is a degree of professionalism required from the holder of this new flying credential that has seldom been required of airmen in the past. In most other professions mediocrity will merely delineate substandard performance. In aviation it is fatal.

Tactical instrument training will enable the aviator to take off, proceed to his destination and if necessary accomplish his mission in an instrument environment designed for the helicopter. The final test of any concept of course is to see if it works!

As experience is gained I am sure the complexion of the tactical instrument training program will change. However, the mission will still remain the same, to produce an aviator who is capable of getting the most from himself and his machine.

The first tactical instrument qualified aviators have recently begun to reach Vietnam. There has also been a noted increase in the amount of instrument flying in Vietnam. It is reasonable to assume there will be a corresponding increase in mission accomplishment.

A good instrument approach is followed up with a good critique

Mission Release

The DIGEST thanks Mr. Howard Brodie and the Associated Press for use of the sketches illustrating this article about the dramatic rescue of five American soldiers from the VC.

THIS OPERATION contained many of the elements of a good nursery rhyme, but it wasn't make believe. There was a smoke-belching helicopter called "Smoky," three ambulance helicopters called "Doctors," one recovery helicopter called "The Wrecker," and one loudspeaker helicopter nicknamed "Loudmouth." At the field Loudmouth was our favorite because it frequently flew over serenading us with recorded music.

The whole thing started when a Vietnamese farmer reported that five U. S. advisors were held in two camps southwest of us. Each camp was supposed to be defended by only 15 guards, and no other Viet Cong were in the area. Submachineguns were their heaviest weapons.

It was first thought this might be a trap, but the man's story seemed to check out. He lived in the area and had helped the loyal forces in the past. Recently five American advisors had been captured and as far as the S-2 could tell had not been evacuated up the Ho Chi Minh Trail.

The farmer said that a VC guard came to his farm to buy food and paid for it with communist money. The guard had bragged about the captured Americans. As proof, the farmer had one of the bills. It was about the same size as a South Vietnamese bill with a picture of a band of VC attacking a truck convoy on one

But there were still flaws in the plan. If alerted, the VC guards might kill their prisoners

side and pictures of Ho Chi Minh, a worker, a peasant, and a scientist on the other.

Of course the captives had to be rescued if at all possible. The staff of the aviation unit got their heads together with the local commander of the Army, Republic of Vietnam (ARVN) and came up with a plan. The concept of operation was to move three ARVN special forces units into the area by air. Two units would make the rescue while the third acted as reserve in case it really was a trap.

According to the map the VC could use only three routes to escape from the area. Special forces unit Alpha would land on one of the escape routes and advance up it to their objective. Unit Bravo would land on the second and use it to get to their objective. The third escape route would be blocked by the reserve unit.

Unfortunately there were flaws in the plan. One was that the troops had to be moved in on the QT. If the VC guards were alerted they might move their prisoners into the nearby woods or kill them to make their own escape easy. The nearest cleared areas suitable for LZs were a mile away from the camps.

Another flaw in the plan was that a lot of rain had left the area drenched. The low spots were under water and the higher ground was marshy. The area was also either heavily wooded or full of low scrub. A landing area would have to be chosen very carefully.

To get the troops into such difficult terrain, a reconnaissance seemed necessary. Yet, a reconnaissance would alert the guard. They decided to trust the map and go in cold.

There was still another problem. The nearest special forces were too far away for our helicopters. Some other type of aircraft would have to be used to bring the troops in and transfer them to the helicopters for the last few miles. It was not certain that the big airplanes could get into our little field.

The commanding officer approved the plan but said the problem of no reconnaissance would have to be solved some way. He proposed that a few minutes before the troops land he and the S-2 would fly in and make a quick reconnaissance. He would use his own aircraft and look at one area while the S-2 used "Smoky" and looked at the other. If either didn't like what they saw they could direct the troops to a better landing spot.

He also said that as soon as the LZ had been marked and before the troops actually landed the two of them would fly around looking for VC in the immediate area. The gunships would fly farther out, doing the same thing. If either saw something the troops couldn't handle, everyone would leave the area as fast as he could.

In this way the CO hoped to make a reconnaissance and move the troops in without alerting the VC guards until the last moment.

The problem of transporting the troops was solved easily. A nearby CV-2B Caribou company said they could make the delivery. When they did there wasn't even the usual dust caused by the big birds reversing their propellers for

The S-2 came into the operation area at a high altitude

The troop ships immediately changed directions and landed to unload the troops

a quick stop. The ground was that wet.

At 0900 hours the next morning everyone took off, the CO and S-2 first, followed by nine UH-1Bs with the three teams. Ringo armed platoon escorted the Alpha team while Viper went along with Bravo. Charlie team flew with Viper and Bravo until they reached their LZ. Their real protection came from the .50 caliber machineguns.

The S-2 came into the operation area at a high altitude. It was almost a solid mass of green below. He oriented himself by the little trail that showed itself once in a while and quickly found the LZ. From the height he was flying it looked good.

When the troop-carrying helicopters came into view the S-2 made his first low pass. The LZ had some small bushes on it and the south portion was covered with water, but it would do.

He had time to make another pass before the troops arrived. In doing so he flew up the trail a little. His crewchief yelled in the intercom to look below. He was pointing to a swollen stream that did not show on the map. Before the rains the trail had forded the stream at this point. Now the stream overflowed its banks. It would be hard for the soldiers to get through that.

The S-2 made a wide turn to the left, all the time frantically looking for another landing spot. Several looked possible but proved to be covered with low growth and water when he examined them closely. Then he saw a cleared area on the objective side of the swollen stream. It was not as large as the original landing zone but it would have to do. He dropped a green smoke bomb and the troop ships immediately changed their direction and unloaded their troops.

The S-2 then flew around the area, getting as close to the trees as possible, but couldn't see a thing. The vegetation was too thick. He got on the phone and talked to the troop commander. The troop commander suggested that the S-2 smoke the area to hide their movements.

After smoking up the place good he moved a little farther out to where the gunships were looking for signs of life. There were none.

Then another problem presented itself. Between the smoke and the dense woods, the troops were having a hard time finding

their way to the objective. The S-2 had radio contact but couldn't see them. So he asked that they send up a yellow smoke signal and soon had them headed in the right direction.

After about two hours of walking through mud and dense vegetation the troops reached the objective. The VC camp consisted of one dilapidated hut and a lean-to. Both were sitting in the middle of a clearing. Scattered around the clearing were several foxholes and trenches.

The trenches had apparently been dug by the VC guards before the heavy rains, but now they were filled with water and were useless. To take their place the guards had piled up logs and what else they could find.

The S-2 made another pass over the camp and noted that only 5 men were behind the barricades. This struck him as being rather strange because the Vietnamese informer said there would be 15.

On his next pass he got close to the woods fringing the cleared area and could see what was under some of the trees. Sure enough, there they were, lying very still and well hidden. When the troops charged the barricades, they would find themselves flanked on both sides by VC with submachineguns.

He immediately told the ARVN commander what he had seen. The troop commander thanked him and said he'd take care of it.

For about 5 minutes nothing seemed to happen. Troops were crouched behind trees and logs but weren't firing. The VC guards were also quiet.

Then with a rush the special forces bounded across the clearing. At the same time there was considerable firing in the woods. The ARVN commander had sent men around to outflank the would-be flanking VCs.

In minutes it was all over. Three of the VC surrendered. The others were either dead or wounded. One ARVN soldier was wounded. One VC had bolted into the woods. He was wounded, so it was not likely he would go far.

In the shack the troops found three of the five American advisors. They were bound and gagged, and had to have a few leeches removed, but otherwise were not hurt.

The ARVN commander called the S-2 on the radio and asked if he could contact "Loudmouth." For some reason he couldn't get through on his own radio. He said he wanted Loudmouth to talk to the VC who had bolted, that wounded as he was, he would probably give up if urged.

The S-2 called Loudmouth and soon he was over the area talking to the wounded man. It didn't take long. In minutes the wounded VC came out of the woods into the clearing, his hands held in a

Then with a rush the special forces troops bounded across the clearing and attacked the Viet Cong

prayer like gesture and bowing his head like the old Vietnamese do.

Now that the operation was over, another problem appeared. The ARVN commander called the S-2 and asked if he thought a helicopter could get in the little clearing. It seems that a VC guard had one of his legs blown off. The commander said that they had placed a tourniquet on the stump and had given morphine but he was afraid the man could not stand the trip all the way back to the LZ.

Due to the arrangement of the trees around the shack in the middle of the clearing the S-2 could see that none of the "Doctors" could make it.

But the shack was a makeshift affair and the trees in the way were small. He advised the commander to clear the area while he called for ambulance helicopters.

As an added inducement he told him that if he cleared a large enough space, the troop ships could pick them up here and save the long walk back to the LZ.

From there on the operation was routine. The "Doctors" arrived and the VC wounded were very impressed with the treatment they received.

When the S-2 got back to the field the CO and his groups had just arrived. They had rescued the other two detainees. Two ARVN soldiers had been wounded but not seriously. They managed to capture two VC guards.

An afteraction critique was not necessary to point out the lessons learned from this mission. One was the importance of visual reconnaissance. If the special forces had landed at LZ 1 they would have been stopped by the flooded stream. Some of them might have gotten across but not many.

Another important lesson was that every available type of aircraft should be used when they are needed. This operation used fixed wing and a variety of different type helicopters.

They had to have a few leeches removed, but otherwise were not hurt

Just as an Army is only as good as its support and supply elements, so too is a helicopter aviation qualification school only as good as its maintenance unit.

Maintenance A Go-Go

Major Gerard A. Donatucci and Specialist 4 Richard J. Gatza

WHEN DEPARTMENT of the Army decided that it didn't have enough helicopter pilots, it concluded that the quickest way to produce them was to train fixed wing pilots to fly helicopters. However, the helicopter schools at Fort Wolters, Texas, and Fort Rucker, Ala., were working at full capacity, so a school in Europe, the Seventh Army Aircraft Training Center, was organized to qualify fixed wing aviators as helicopter pilots.

USAREUR picked the Schleissheim Army aviation field as the site for the first helicopter aviation qualification school in Europe because of its adequate hangar space, billeting, training areas, and the presence of a qualified general support maintenance company—the 661st Transportation Company of the 205th Transportation Battalion.

The new Schleissheim school occupies an old German airbase a few miles north of Munich, Germany. The airfield was bombed out during WW II. A few of the buildings are still standing, but most of them have either been leveled, or have only scarred walls remaining. New, smaller buildings have replaced them. The school now has one large hangar.

Any aircraft must be in A-1 condition before it leaves the ground, but with aircraft used in training this is doubly important because the personnel flying them may be rougher on them than a veteran handler. This puts an added burden on the personnel maintaining the aircraft to keep them operating at a better than par status.

At Schleissheim the maintenance support section is called the School Support Platoon. Its 160-man augmentation is attached to the 661st Transportation Company and falls under the 205th Transportation Battalion.

The school opened with a 26-student class on March 14, 1966. But there was little real time for preparation because method-of-instruction training for the instructor pilots began three weeks before the student training.

To meet the demand of keeping his helicopters maintained, the maintenance chief enlisted the help of 7th Army Support Command's aircraft maintenance chief to search personnel resources in 7th Army for UH-1B and OH-13 crewchiefs and other personnel necessary to get the job underway. Crewchiefs were chosen

on a basis of time left in Europe, their MOS, and whether they were bachelors. (Bachelors were preferred because much of the maintenance work would have to be done at night or late in the evening because the school had night flying courses.) The chief was able to build a 150-man maintenance operation plus a half dozen NCOs to supervise the sections, and two warrant officers to double as maintenance officers and as test pilots to handle the 76 aircraft used by the school.

Once the men were rounded up, the work of training them to be proficient in their MOS began. They had to be trained to do the job quickly, dependably and without flaw. The training the new men underwent ranged from cleaning OH-13 helicopter bubbles to maintaining aircraft records. Records training ran for two weeks, two hours a night, five days a week.

The process used to familiarize the men with repairing the aircraft was to have them run through each different type of inspection with its correlating maintenance requirements. Time and time again, day after day the points to be checked and what to look for in each particular area became automatic, almost second nature, to them.

In a word, they were given experience, which was the main thing they lacked. This method also revealed those individuals suited for crewchief responsibilities and those who were skilled enough to work on troubleshooting teams.

The concept of the organization

Bachelor crewchiefs were preferred

was based on the scheduled maintenance requirements necessary to support a 16,900 OH-13 flying hour program in an 8 month period and an 8,800 UH-1B flying hour program in a 7.5 month period. Crewchiefs were to perform their own daily inspections which totaled an average of 704 daily inspections a month. Crews were set up to accommodate intermediate and periodic inspections.

Intermediate inspections were performed by crews composed of one 67Q20 (single engine rotor helicopter repairman), two 67A10 (aircraft maintenance mechanic helpers) and one 67M20 (single rotor observation helicopter maintenance man) for each of the three intermediate inspection teams assigned to the OH-13 helicopter. Four intermediate inspection teams are assigned to the UH-1B. Each of these teams consists of one 67Q20 and two 67A10.

Periodic inspections take place after every 100 hours of flying time. For these inspections the school support section has three crews for the OH-13, each crew consisting of one 67A10, two 67Q20, one 68E20 (aircraft rotor and propeller repairman), and one 68B20 (aircraft engine repairman). UH-1B helicopters at the school require two teams for periodic inspections, each crew made up of two 67Q20, one 68B20 and one 67A10.

The number of crews necessary depended on the number of days, or portions of a day, required to complete the inspections and the size and maintenance skills of the crews. To give the necessary flexibility to the maintenance operation, personnel with direct support skills were included in the crews. The average number of intermediate inspections to be performed monthly amounted to 90 for the OH-13 and 60 for the UH-1B, while the average number

A test pilot for UH-1B helicopters at the USAREUR helicopter qualification school sets down a UH-1B he has test flown after a periodic inspection

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Periodic inspections take place after every 100 hours of flying time

of monthly periodic inspections came to 30 for the OH-13 and 15 for the UH-1B.

Experience showed that four troubleshooter teams are necessary to handle the 50 OH-13 helicopters. Each crew consists of one 67Q20 and two 67M20. Two such teams were needed to handle the 26 UH-1B helicopters with two 67Q20 comprising each of them.

Since the month of March was largely devoted to training mechanics, no statistics were compiled as a check on the maintenance manhour/flying hour ratios. However, since that time statistics were kept. Each OH-13 flying hour required an average of 5.26 maintenance manhours from organizational through general support level. Each UH-1B flying hour required 6.19 maintenance manhours. These figures compare favorably with the ratios published in AVCOM Pam 335-3 which reflects 4.61 manhours from organizational through general support level for every OH-13 flying hour and 6.38 manhours per flying hour for the UH-1B. The size of the aircraft fleet requires an average of 825 UH-1B flying hours and 1,553 OH-13 flying hours monthly.

The test flying hour requirement to keep these aircraft in top-notch shape is long and tedious. Test pilots have been flying between 60 and 80 test flight hours monthly. As of 31 July 1966, a total of 2,450 test flight hours have been flown.

Fulfilling the maintenance requirements of an Army Aviation Qualification School by an Army maintenance unit is an Army aviation first. To the knowledge of local authorities no other TOE general support type organization, even with augmentation, has performed the complete maintenance mission in support of a helicopter aviation qualification school. Civilian aviation contract maintenance is normally used by the Army since TOE units must contend with a rapid turnover of personnel, training of new personnel who have completed only basic MOS training and numerous other nonmission requirements.

Probably the most significant thing about the maintenance support of the school at Schleissheim is its ability to operate on a par with civilian type organizations doing the same job.

The augmentation attached to the 661st Transportation Company has made it possible for the company to continue its normal job of providing backup direct and general aircraft maintenance support and parts supply support to five U.S. Army units with a total of 250 fixed and rotary wing aircraft.

When the augmentation personnel first arrived, the commanding officer of the 661st Transportation Company briefed them personally, spending one to two hours with each group. Approximately 150 were briefed on the scope of the mission and the concept of the operation. Nearly all of the new men showed a high degree of motivation. Several of those who were accepted and attached to the company came back to the CO and apologized for not being as qualified in their MOS as they should have been. They told him they didn't think they could do the job, and didn't want to damage the program. The CO said that generally one or two are that conscientious about their jobs, but this time there were several. Many of the attached men later asked to be transferred to the company permanently.

Four troubleshooter teams handle the OH-13s

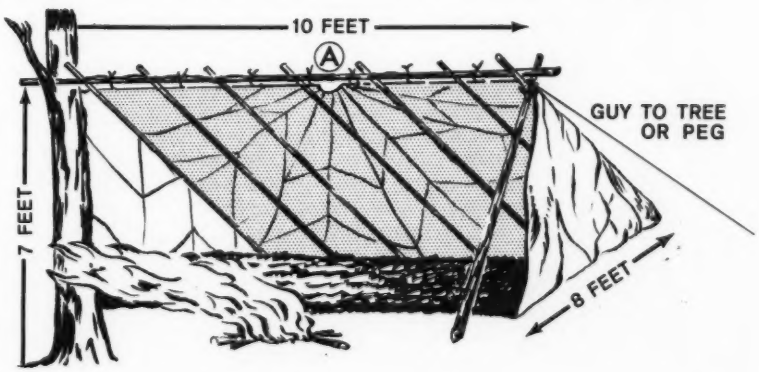
The Schleissheim school itself is set up to handle nine classes of 26 students. Every four weeks a new class arrives and instruction overlaps for the first two weeks and last two weeks of the new and old classes respectively. Student training includes 60 hours in the OH-13 and 25 hours in the UH-1B. Half of the student day is spent in the classroom and the other half in flight practice instruction. Students not only have to become familiar with operating the helicopters, but also have to learn night flying, simulated engine failure landing, pinnacle approach, cross-country flying, flying in formation, and flying by use of instruments only.

In the first four months of operation the school had qualified 105 fixed wing pilots as helicopter pilots. They have flown 11,023 student hours in the four month period with no incident or accident caused by defective maintenance care.

Statistics used are through 31 July 1966.

Parachute Survival Sense

A 3-man lean-to may be made from your parachute. A pole framework of the approximate size shown should be covered with parachute cloth and tied as indicated. The apex of the chute is secured at point A. This shelter can be made quite comfortable. A small fire built in front of the opening will keep it dry and warm.



GARBAGE AROUND HIS HIPS

Captain Gary V. Dennison

The author contends that too often Army Aviators are required to carry extraneous material not needed in peaceful areas.

DURING A RECENT field exercise in Germany an O-1 departed a field site with two persons on board, a full load of gas, a Jeppesen case, and assorted personal field equipment. Approximately 20 minutes later both the pilot and his passenger were dead, and the aircraft was totally destoyed.

At the time of this writing the accident board is still in progress. There are indications that the accident was caused by a spin from a low altitude due to a high speed stall. There is also the possibility, however, that the controls were jammed by loose field gear such as the protective mask or the M-14 rifle which the passenger carried. It is unlikely that the real answer will ever be known.

This accident again points out, however, that the Army Aviator is required to carry extraneous material, not needed in peaceful areas, which can cause him to lose

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his life.

In the O-1 aircraft, weapons, protective masks, web equipment, canteens, and related items contribute to weight problems. For the passenger (and most wear the gear rather than store it) exit also becomes difficult in a moment of emergency. Wide, full fleshed, American hips, further expanded by a hip holster on one side and a mask on the other is a rather large object to slip through the restricted space of such an aircraft.

In cargo or utility helicopters the problem is mainly one of inconvenience, since storage space is adequate and the crew is only bothered by constantly dressing and undressing. In case of an emergency landing, however, this gear becomes "flying missiles" and could easily cause passenger injuries.

In observation helicopters the threat is more serious and more apparent. Masks and steel pots have jammed torque pedals on such a known basis that every OH-13 pilot automatically expects it to happen again and again, despite his pleas to be "careful."

Also imagine, if you will, the masking problems of the OH-13 or OH-23 pilot. He's flying along and gets the word to mask immediately. All he has to do is reach down 2 feet in front of the pedals, whip the mask out of the carrier, remove his helmet and place the mask securely over his face. Now he suddenly realizes he can't hear anyone because his flight helmet is down on the floor, but it doesn't really matter since he couldn't get it on over the mask anyway. Meanwhile he is flying without using his hands—a truly remarkable feat.

Nor does any aviator wearing a flight helmet in an aircraft need the burden of carrying a steel pot, since his exposure to enemy fire is greatest while he is airborne and while he is wearing the flight helmet. During peacetime the steel pot can and does cause accidents.

The aviators in one aviation unit in Germany came to the following conclusions about this and related subjects after the experiences gained by participation in a fast moving tactical exercise:

• Winter flight suits and jackets are ideal garrison and field uniforms during cold weather. They are comfortable, manufactured for the job, and meet safety criteria.

• Shoulder holsters, not hip holsters, should be mandatory issue for aviators. With the shoulder holster and a pistol the aviator is able to provide himself with individual protection, without interference with flight controls and bodily movements.

• Soft caps, such as the standard fatigue ball cap or the pile cap should be the authorized headgear outside of the cockpit for reasons previously mentioned.

• They recommended elimination of the requirement that aviators be made to carry the protective mask. At present, they do not believe their suggestion will be favorably considered, but they are attempting to obtain substantiating data to verify their beliefs.

• The group recommended the elimination of all web gear, pouches, canteens, etc., as items of wear for aviation personnel. In short, the flight suit with a shoulder holstered weapon is *the* uniform. Upon departing an aircraft the aviator changes nothing; he only adds a soft cap in place of the helmet.

Will these aviators be successful? Is their reasoning sound? It *is* possible. Already this group has the distinction belonging to one of the few units that wears the flight suit as a duty uniform.

Army aviation is progressing; we have new aircraft and better maintenance; we have a valid mission and the means to accomplish our job. But let's not forget the plight of the aviator—the man with the garbage around his hips.

Field gear makes the small cockpits of the O-1 and OH-13 even more cramped

HELICOPTERS

In A Public Relations Role

Major Glen W. Stout

HELICOPTERS are helping to tip the scales in favor of our friends in Vietnam. They have earned a respected place in assisting the Army to move fast, shoot straight, and communicate dependably. But another role in which helicopters have proved to be equally adept is a public relations role.

Helicopters have been used extensively for air-sea rescue at scenes of civil disaster and to transport food and supplies for civilian populaces caught in the grip of floods, droughts, and earthquakes. But one facet of their public relations role remains a relatively untold story: they have done much to encourage a sense of security among the peoples of allied nations by demonstrating the technique of tactical airmobility. This too, strange as it may seem, serves a public relations function.

A recent artillery battery exercise in the mountains of Korea offers a fine example of this type of public relations role—building confidence in our American soldiers, their equipment, and their professional competence.

In late summer of 1965, Battery B, 6th Missile Battalion (Hawk), a unit of the 38th Artillery Brigade (AD), had the mission of setting up a tactical equipment display and demonstrating the Hawk system to students of the Combined Arms Center (CAC), Republic of Korea Army.

The battery, located near Kunsan on the west coast of Korea, moved an entire assault fire unit, complete with radars and missiles, to Kwangju—a distance of more than 70 miles.

Two staggering problems confronted the missile battery. First was the element of time. Only a few days advance notice was given and a myriad of tasks were involved in the preparations. The second problem was that washouts along the steep mountainous road made towing the sensitive equipment by the 2½-ton truck all but impossible.

However, the Hawk system was reportedly capable of being airlifted by helicopter. Although no unit in Korea had ever made such a move with so much equipment for so great a distance, the 19th Transportation Company (Medium Helicopter), stationed at Pyongtaek, rose to the occasion.

CH-37 Mojave helicopters transported the equipment, which was suspended on slings beneath the craft, in two days of shuttle runs.

The first day two helicopters made three round trips between Kunsan and Kwangju. The six loads were composed of the continuous wave acquisition radar (CWAR), the high power illuminator radar (HIPIR), one generator (45 KW), the assault fire command console (AFCC), the crewchief junctions box (CCJB), two training missiles on a pallet, and one launcher. Additionally, 14 personnel were airlifted—two or three men per trip. This equipment and personnel constituted a complete assault fire unit (augmented by the CWAR).

On the following day, three helicopters were used to transport additional launchers, missiles on pallets, a loader-transporter, generators, power and data cables, camouflage nets, sandbags, personnel, and miscellaneous equipment. During the two days over 50,000 pounds of vital, sensitive Hawk missile equipment and 40 men had been airlifted by helicopter without a hitch.

The display was tactically presented with the system fully operational. It also featured sand-

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Time was running out, and washouts in the mountains made transporting the Hawk missiles by truck impossible. However, the CH-37s met the challenge and the missiles were set up on schedule.

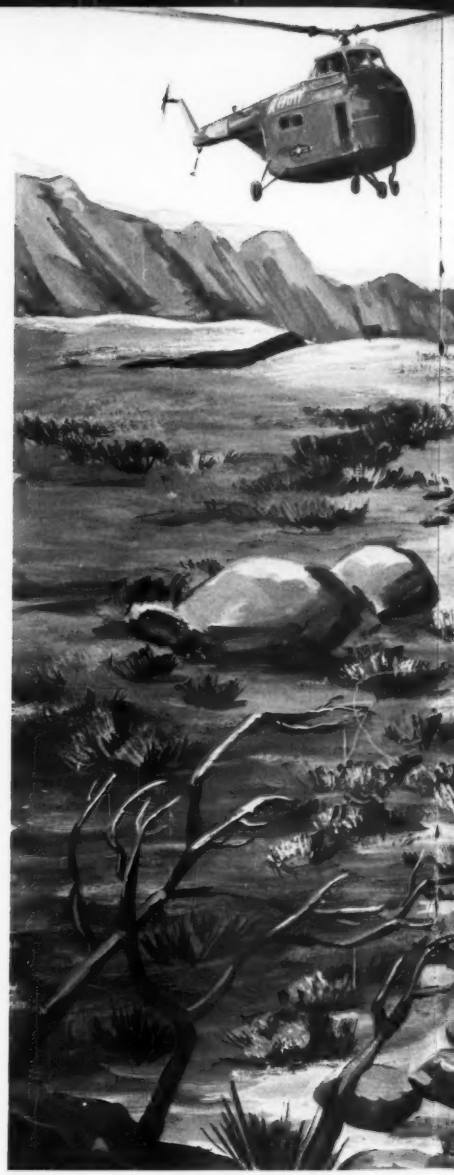
bag revetments, latest camouflage trends, and typical ground defense positions for crew-served weapons similar to those used at Hawk site locations in the Republic of Vietnam. Over 15,000 interested students, curious Korean civilians, and visiting dignitaries were awed by the speed and efficiency of the whole operation.

Having more time and a repaired road, the missile battery returned to Kunsan by vehicle. But the helicopters had met their challenge. When needed they were there, and in the truest traditions of Army aviation they gave support to a combat arms program that otherwise might not have materialized. They helped to make the soldiers and populace of an allied country aware of the Hawk missile's power and mobility.

Although the operation was not planned as a public relations function, the end results were undeniable. A new chapter was added to the proved versatility of helicopters, and the public image of the American Army abroad was enhanced. Helicopters had helped to bolster the Korean confidence in America as much as any expenditure in dollars or any civic action program could have done.

Aviators should be able to determine a helicopter's capability to perform at high altitude. Perhaps you can, but you may still learn something by reading about the time that

Peter Pilot Picked A Peaked Plateau



Major Jack O. Phillabaum (Ret)

IT WAS A BEAUTIFUL field grade type flying day as CPT Peter Pilot was ferrying a UH-19D from Fort Rucker, Ala., to his home field in California. The flight so far had been just about perfect; weather was warm, winds were with him, and all instruments were staying right in the middle of the green.

"It's just as well too," Pete reflected. "The refresher ride I got at Rucker before I picked up this Hog was okay, but as supply officer for my outfit, I don't get to fly as much as I would like. Besides, I hadn't flown a UH-19 for 3 years."

Pete was west bound on Victor 16 and coming up on Guadalupe Pass. As he eyed the high ground he was beginning to pass over, he tensed a little on the controls. He had flown this route before and knew the strange and turbulent wind conditions he could pick up going over that pass.

With a slight start, Pete realized he was hearing his aircraft's call sign over the radio.

"Army 47326, Army 47326, this is Flat Rock radio. Over."

"Flat Rock radio, this is Army 47326. Go ahead."

"Army 326, what is your location? Over."

"This is 326. I'm about 1-5 miles east of Flat Rock, Victor 16, passing Guadalupe Pass. Over."

"Roger 326. An Air Force pilot has ejected about 2-5 miles northeast of here. We have him now on his emergency radio. He says he's on a small plateau and has a brok-

en leg. Do you think you could help us in a rescue? Over."

Well, of course, Captain Pilot said he would sure try. After getting all the information he could about the location of the downed pilot, the call sign he was using, and the estimated weather conditions, Pete changed his flight plan and struck out on his new mission. En route, Pete got the Air Force pilot on 243.0 loud and clear.

"Army 326, this is Dodger 21, Lieutenant Fireball here. I'm some kind of glad to hear you're coming. I've got a bad break in my left leg. There's a bone sticking out through the skin, and I can't stop the bleeding. How far away are you? Over."

"I estimate I'm about 20 minutes out, Lieutenant. You'll have to direct me to your location as soon as you hear or see me. Also, what's the ground like where you are? Do you think there is room for a helicopter to sit down? Over."

"Roger Army. I'm on a small plateau about 200 or 300 yards wide. The ground is flat except for a few boondocks and boulders scattered around. It looks like there are a number of places you could sit down. Almost no wind is blowing right now, and, oh yeah,

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Before his recent retirement, MAJ Phillabaum was Tactics Plans Officer, Plans Division, Director of Instruction, USAAVNS, Ft Rucker, Ala.

I've secured my chute so it won't tangle in your blades. Step on it will you—this leg is beginning to give me fits. Over."

"Roger Dodger 21. Just hang on; I'm on the way."

A hundred things started to race through Pete's mind in a mild form of panic.

"Whoa there, buddy boy!" Pete thought to himself. "Let's analyze this problem, get our ducks in a row, and see how best to get this man picked up. Let's see," he mused as he unfolded his map, "it looks like Lieutenant Fireball must be right about in here. Terrain varies from 6,000 to 8,700 feet. Darn! Wish I remembered more about the high altitude capabilities of this UH-19. I must be about 7,000 pounds gross weight now; the maximum gross weight of the D model is 7,900 pounds. Hmmm, that gives me a pretty light ship, and this D model is more powerful than the C models I was flying 3 years ago. If I just had more time I could get the charts and books out and determine whether or not I could make a pickup at this altitude. No time for that, though, so guess all I can do is try."

Lieutenant Fireball's voice was showing definite signs of pain and weakness. "Army, you're passing by me; turn right 90°." His voice now grew excited, "Yeah, that's it, you're coming right for me now! Can you see me?"

"Not yet, Dodger. I think I see the plateau you're on, though." After a couple of minutes, "Okay, Lieutenant, I've got you now. Just hang on; I'll have you out in a minute."

Lieutenant Fireball's voice was becoming very weak and halting. Peter knew he was probably going into shock.

Pete made a pass over the area at about 500 feet. The adrenalin was really beginning to flow through his veins. "The area doesn't look too bad," Pete thought as he made a right turn onto downwind for his approach. "There is no wind, so I'll make a shallow approach to that area about 50 yards short of the pilot."

A knot of tension was beginning to form in Pete's stomach and his thoughts were starting to race again. "Keep it smooth; don't get excited. Need to keep translation speed until touchdown. Area looks big enough for a little ground roll. Have to get on the brakes as soon as the wheels touch. Okay, slow it to 20 now. Where did those boulders come from! Can't touch down there. Go around! Still settling. Overboost, to hell with the engine! Can't stop; going to hit! WHUMP, SNAP, CRUNCH."

"Flat Rock radio, this is Army 326. I just tore my forward landing gear off on a rock. I'm losing oil and can't take off. Looks like there are two people up here to pick up now. Over."

———

CWO Gordon Goodguy had some maintenance problems with the UH-19D he was going to ferry from Fort Rucker, and he was about an hour late on his planned takeoff time. He and Captain Pilot had met two nights before at the Fort Rucker officers' club. During the course of their conversation, they discovered they would both be ferrying UH-19Ds the next day, and would be flying the same route as far as El Paso, Texas.

Gordon and Pete took an immediate liking to each other and they decided to fly together as far as El Paso. Neither of them wanted to violate the unwritten Army aviation regulation which states, "No good aviator will overfly El Paso on a cross-country." So they agreed to RON there and pick up a jug or two across the border that night.

The next day maintenance wasn't sure when Goodguy's ship would be ready. Captain Pilot decided he had better be getting on his way. As he started out of operations, he called over his shoulder to Mr. Goodguy, "Gordon, if and when I get to El Paso, I'll be staying in that motel at the airport. When you get there, check and see if I'm in." With a thumbs up affirmative from Goodguy, Captain Pilot departed for his aircraft.

A day later CWO Goodguy was on Victor 16, west bound, and he began to pick up bits of weak conversation on his guard receiver. "Sounds like someone trying to make a rescue—hey, that's Captain Pilot's voice I hear."

Gordon strained to hear every word coming from his headset. He turned off all radios but his UHF and adjusted volume and sensitivity for the best reception.

"Yep, that's Captain Pilot. What in the devil is he doing? How did he get on a rescue mission?"

The radio became silent. Not enough intelligible conversation had come through the headset to tell Mr. Goodguy just what had happened. As he drew nearer Flat Rock, he made a call and the radio operator quickly filled him in on the details. With a sinking sensation in his stomach, Goodguy knew that if Captain Pilot had trouble landing up there, then he probably didn't have much chance either. Still, that Air Force pilot was in bad shape and needed to be rescued quickly.

Captain Pilot had told Flat Rock radio he would call every 15 minutes and Mr. Goodguy intercepted his next transmission.

"Army 326, this is Army 403. I'm coming up to try and get you and that AF pilot out. Over."

"Army 403, this is 326. What type aircraft? Over."

"This is 403. A UH-19, Chief Warrant Officer Goodguy at your service. Over."

"Gordon, I'm afraid you'll have to forget it. Density altitude here is just too high for a UH-19. This pilot I came after is really in bad shape, though. I've got his bleeding stopped, but he has gone into shock."

A quick check with Flat Rock revealed no other rescue equipment would be on the scene for several hours. When he heard that, Mr. Goodguy made his decision: He was either going to get the Air Force jock out or establish a detachment helipad on that plateau with Captain Pilot.

A small airstrip appeared before him as he crossed Guadalupe Pass. He landed, hopped out, and started throwing 780 gear and spare parts out of the aircraft. Everything that wasn't nailed down had to go, including as much fuel as he could spare.

Before landing, Gordon had received a complete rundown from Pete on the techniques of his approach, the amount of cargo he was carrying (about the same as Gordon's), the weather, and the obstacles on the ground.

Ten muscle-straining minutes after landing, Mr. Goodguy was en route to the greatest adventure of his life.

A few months back, he had developed a plan by which he believed he could determine the high altitude landing capabilities of a helicopter without making reference to performance charts and meteorological data. He had been looking for a chance to test this plan for a long time, and he knew the opportunity had finally arrived.

Mr. Goodguy made a low pass over the plateau and checked for a better landing spot than Captain Pilot's. He also noted his indicated altitude was 7,500 feet. After this low pass, he flew his aircraft off to the side, away from the plateau, and climbed to 8,000 feet. His plan was to shoot a simulated shallow approach down to 7,500 feet and 20 knots indicated airspeed. At this point he would attempt to go around without descending below 7,500 feet.

Gently he started his simulated approach. All the needles were steady; rate of descent was good. A gradual deceleration was begun so as to arrive at 7,500 feet and 20 knots airspeed simultaneously.

Peter Pilot waved as the UH-19 made a low pass

Goodguy began his go-around very smoothly. The vertical speed indicated level flight; altitude held at 7,500 feet. Slowly the airspeed began to climb; still no descent past 7,500 feet. Now the UH-19 was beginning to climb, slowly, but it was a climb.

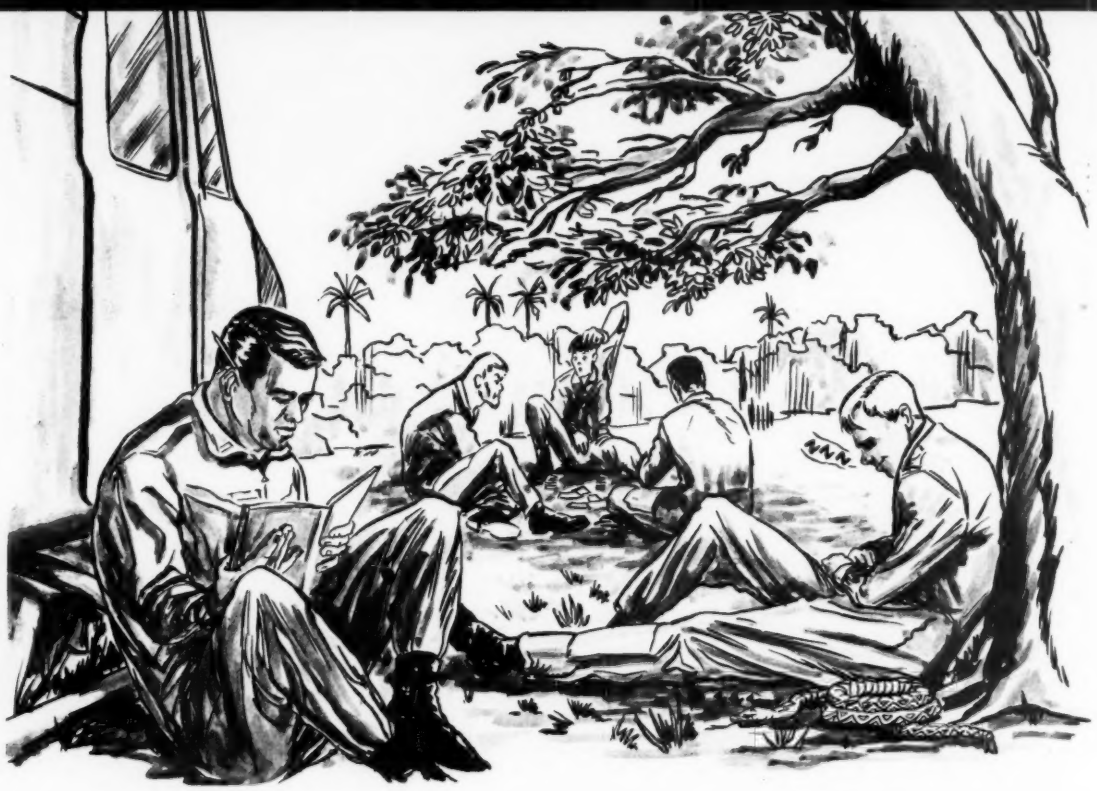
Gordon gave a sigh of relief. He was now sure that he could make an approach and abort, if necessary, and if he did land he would have sufficient power to at least taxi and make a running takeoff.

Mr. Goodguy began his actual approach. Pete had done what he could to improve the planned landing spot, but a number of large boulders remained strewn about the area. The approach was progressing as planned. At 50 feet from the ground, Gordon realized he was overshooting. His go-around was agonizing, but successful.

While setting up his pattern for the next approach, Gordon's thoughts ran about like this: "I saw a much better spot to touch down on that last approach; I must change my direction of approach a bit, though. Okay, here we go, slow and easy now. When the wheels are about 5 feet off the ground, I'm going to slow below translational airspeed and touch down as close to zero as possible. I can't afford much ground run, so even if I do fall through the touchdown won't be too hard, and I'll be on my brakes."

Touchdown point was only 100 feet away now. "Everything looks good; got to start slowing down more. Max power! Falling through! No sweat. Brakes—look out for that rock. More brakes! Whew!

"Flat Rock radio, this is Army 403. I have both pilots aboard and am en route to your location. The injured pilot is looking much better; I think he will pull through just fine. Over."



Learning The Write Way

Lieutenant Colonel Gordon L. Kinley

FINALLY I SAT down and wrote a letter to the Wright brothers telling them what I thought I had done, and they wrote back and told me what I ought to have done. That started my correspondence course with the Wright brothers, and I guess it made me the first correspondence course airplane pilot in history."* So wrote General Foulois in recounting his experience back in 1910.

Although correspondence teaching played an important part early in the history of flight training, it is not suggested that the Army teach flying by correspondence. Experience has proved that there are better ways to learn to fly. This doesn't mean that correspondence training is useless. Correspondence, or extension training, as the Service prefers to call it, occupies an important place in the Army training program. It could play an important part in the career of every reader.

Intensified manpower demands of the Vietnam conflict have disrupted the normal career patterns of many military personnel. This is especially true for active duty commissioned aviators. For these individuals an acquaintance with Army extension training could play a decisive part in their future. "Learning the Write Way," offers the military man a real advantage to further his career and extend his knowledge.

It was mainly this group that the Army Chief of Staff was referring to when he addressed the Army Aviation Association of America annual meeting in October 1965.

General Johnson said, in part, "In the first place, we have had to discontinue most of our ground tour for aviators simply because

*"The Day I Taught Myself to Fly" by Major General Benjamin D. Foulois (USAF Ret.) as told to Harold L. Craven, Vol IX, No. 9, "The Airman" magazine, September 1965.

the rate of expansion, up to this point, has been all we can manage, with the people we have available to fill the cockpit seats of our aircraft." Later he said, "At the same time, deferring people from ground assignment has meant in some cases deferment from school." The Chief of Staff went on to say that steps were being taken to make sure that these actions had no harmful effect on careers. He further stated that he hoped by late 1967 or a little bit later, events would permit aviator career patterns to return to normal.

At some time in the future the aviator career pattern will return to normal. The trouble is that no one, not even the Chief of Staff, can predict when. Meanwhile, time passes and some aviators find themselves in a promotion zone. It is hard to believe that when the board convenes to consider officers for promotion, it will completely overlook the absence of branch experience and schooling of the aviators being considered. Perhaps the presence or absence of a remark on an officer's record concerning service school attendance will decide whether or not that individual makes the selected list.

Everyone expects to progress in his chosen field. An Army officer must attend the career service schools if he is going to qualify for promotion and positions of increased responsibility. Deferment of branch career schooling will delay attendance at the Command and General Staff Course. Many higher staff positions require the incumbent to be a C&GSC graduate. Do you suppose the commander concerned would be satisfied with an aviator who lacks this training if a qualified graduate is available?

Granted the situation outlined won't happen to everyone, and you can be sure that the Office of Personnel Operations, Department of the Army, will do everything possible to keep it from happening to anyone. In spite of this, it will happen to some who failed to do what they could to prevent it.

What can be done? You may not be able to acquire branch ground duty experience, but you can seek appropriate aviation command duty and you can acquire the necessary service schooling. It is possible for an infantry officer, for example, to graduate from the career course and the Command and General Staff College without ever having set foot on Forts Benning and Leavenworth! The same applies to officers of the other branches. How can it be done? Through extension training.

Twenty-three Army schools offer extension training courses. Over 1,200 subcourses are available from these services schools. As of 1 January 1966, over 200,000 individuals were actively engaged in Army extension training. Of these, 22,000 were engaged in branch career courses and 4,650 were attending the U.S. Army Command and General Staff College by mail! That is a pretty impressive set of figures, and these totals are bound to increase. The emphasis placed on extension training by the Department of the Army Board to Review Army Officer Schools, February 1966 (Haines Board) proves it. DA recently approved a recommendation by the Board that the Army War College establish an extension program for officers of all components. It soon may be possible to secure a diploma from that school without ever seeing Carlisle Barracks!

The reader should not be misled into thinking that he can take any course he chooses. Many courses have prerequisites that must be met before the individual will be enrolled. For example, you must have credit for a career course to be enrolled in the Command and General Staff College.

Most of these more than 1,200 subcourses are special interest or specialist subcourses. (A subcourse is a group of lessons covering one unit of study.) Service schools combine a number of them to make up special extension courses that lead to qualification in certain MOSs or specific skills. Eligibility and enrollment requirements are published in DA Pamphlet 350-60, "Announcement of Army Extension Courses."

This publication lists courses and subcourses offered by each Army service school. Included is a brief description of course content and an estimate of the number of hours required to complete each part. Eligible individuals are encouraged to examine the list of courses and enroll in those in which they have an interest. Absolutely no cost is involved in Army extension training. The courses are free and are shipped complete with study and reference material.

Effective 1 July 1966, the Army Aviation School began a limited offering of aviation specialist courses (see Aviation Digest, August 1966). Those readers interested in nonresident Army aviation training should write to the Commandant, U. S. Army Aviation School, Fort Rucker, Alabama 36360, ATTN: Department of P&NRI.

Over 200,000 are taking advantage of various Army extension training courses

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Last July the U. S. Army Aviation School began offering a number of aviation specialist correspondence courses

On successful completion, all extension training becomes a matter of official record. AR 611-103 requires an entry in item 16, DA Form 66, when an officer successfully finishes a complete course. In the case of enlisted men, an entry is made on the DA Form 20. Certificates of completion of extension training by eligible government employees are forwarded to their superiors for inclusion in field 201 files.

So far this article has only dealt with Army nonresident instruction. If interested, and if you have the prerequisites, you can attend by mail schools of the other services as well. The Naval War College offers eight extension courses for officers of the U. S. Armed Forces. Some of the subjects offered are command logistics, military planning, naval operations, international relations and international law. Detailed information can be obtained from the Extension Education Department, Naval War College, Newport, Rhode Island 02844. Officers interested in the Air War College can write to Air War College (AWCAPC), Maxwell AFB, Alabama 36112, for detailed information on course offerings and enrollment procedures. Be sure to include your serial number, grade, and address in your initial letter.

A lot of people will not consider learning by mail because they are convinced it is useless. After all, one argument goes, how can I learn without an instructor present? Properly prepared correspondence courses do an excellent job of teaching the subject in spite of the absence of an instructor. The Army puts a lot of faith in extension training and the Haines Board has reemphasized its worth.

Another often voiced objection to extension training is, "I'm too busy. I never could find time to do the assignments." What these people really mean is they are afraid to try it—afraid that they will keep putting the lessons aside and, therefore, never complete the work.

The answer to this objection can be found in an adequate incentive plus a personal study program. One thing everyone should realize is that there is no penalty for failing an extension course, so there should be no fear of trying it. Nothing appears in your records to indicate that you couldn't pass or failed to complete a nonresident course. Certainly, improved promotion potential should be incentive enough for the career aviator to give it a try. The real problem then is the study program.

The first thing to be done on the study program is to evaluate the situation. In specific terms this means determining: When should I plan to complete the course and do I have the time I will need to devote to it? Obviously, if one is in a seven day a week, dawn to dusk combat situation he doesn't have time for extension work. On the other hand, the man who does have free evenings and weekends can budget his time so that he is able to participate regularly. The key to the whole problem is recognizing the time that can be made available and then doing the lessons at the time. This takes planning.

Let's assume that you are an average infantry captain who hasn't attended the career course. You are helicopter rated and have just arrived in Vietnam where you have been assigned to a helicopter airmobile company. You

Television commercials, cowboys, animal trainers . . .

The Army's extension courses are offered free to eligible personnel

can count on being there for 50 weeks.

The Infantry career extension course consists of 142 lessons and 35 examinations, which require 452 hours for the average student to complete. This means that if you can program nine hours each week to devote to the career course you earn your diploma by the time you complete your tour.

These nine hours don't have to be spent at a desk either. You can cover the reading assignments during the waits between flights that you now devote to talking, drinking coffee or reading paperbacks. It is recognized that you can't do this reading on combat assaults, and sometimes the wait between flights is too tense to be conducive to study. The point is that many combat support and administrative missions will permit this type of study if you remember to bring the texts with you. Of course there are lessons which involve map exercises, and these do require a place where maps can be spread out and overlays attached. Probably these map exercises can only be done in your billet area.

The thing to remember is that much of this learning can be acquired as you perform your regular duties. This is why you analyze the situation. If you decide you want credit for the career course at the end of your tour and can figure out how to devote nine hours a week to acquiring it, you have a good bit of the problem solved. The same thing applies to the Leavenworth course. It is a little longer: 156 lessons, 28 exams and 599 hours. To do it during a normal tour would require 12 hours per week. The Vietnam situation was selected only for illustration, with full realization that particular circumstances would prohibit opportunities for formal study.

By now a number of you are saying that it won't work, the solution is too pat. If nothing else, delay in the mails will upset the time table. This is true, mail delays as well as sustained field operations can knock out your study plan before you really get started. In spite of these hazards and setbacks it should be possible for many aviators to attain study goals by using available time.

Most schools mail out several lessons or even a complete subcourse in one package. Some of the material covered in the branch career courses is a repeat of what you have already learned in your aviator training. These lessons can be covered rapidly. Combine these two facts and you can see that even if you get behind it should be possible to catch up later.

Establish a monthly goal, too. It will help you finish on time. Twelve lessons or 35 hours make a sensible monthly objective. This is actually less time than that spent by a lot of service personnel who are seeking college degrees through off duty study.

So far the stress has been on taking correspondence work in Vietnam. It certainly can be done in CONUS or in any other duty area. A lot of you may think that the demands of home and family will keep you from doing this work. Perhaps your quarters don't provide the space and quiet you need for study. There is no question that a good atmosphere is necessary if your attempt to study is going to succeed. A blaring TV set and boisterous, hollering children will go a long way toward discouraging the most dedicated student.

If you can't study at home then you must find a place where you can. A good choice is the post or

and other distractions make studying at home difficult

The library—or your office—are good places to study

public library. Sometimes they offer private research rooms which are ideal. Even if they don't, the quiet noise-free atmosphere of these places makes them an ideal place for study.

Another good place for study is your office. Most offices are empty and quiet after duty hours. The lighting and heating are usually adequate and the interruptions should be few. If you don't have free access to this area, consent should come readily after you explain to your superior why you want to use it.

Regardless of the obstacles, it is possible to complete any of the various career courses by correspondence in an acceptable period of time. The key is planning so that time is budgeted and goals are established. Don't get discouraged. Keep at it and reach your weekly or monthly goals on time, or ahead of schedule when possible. If you do this, the final objective will be yours.

Self-improvement is the responsibility of each of us. It is unfortunate that the situation in Southeast Asia has interrupted the career pattern of so many Army Aviators. Fortunately, for many of those who are willing to make the effort, there need be no education impairment. The ambitious aviator can keep up with—or get ahead of—his contemporaries by attending his service school by mail. He knows that through a little extra effort on his part he can prepare himself with the schooling he needs to qualify for promotion and choice assignments.

What worked for General Foulois back in 1910 will also work today. He turned to correspondence when there was no other way. Don't you think that now is the time for you to consider "Learning the Write Way"?

Bird Dog Captures VC Private

HUNGRY, TIRED of hiding, and by his own admission miserable, a lone North Vietnamese private resigned from Ho Chi Minh's army in somewhat unusual style.

He surrendered to a U. S. Army Bird Dog airplane.

The man said his entire 6-month trek from North Vietnam had been made perilous by the almost constant surveillance of American spotter pilots. Three days earlier, over half his company had been killed and most of the rest wounded when one of the little planes had brought an airstrike with it.

Coincidentally, it was the first lieutenant who had called the strike who was also credited with the capture. Representing the 17th Army Aviation Group's 183d Recon Co., 10th Battalion, the lieutenant was taking a low-altitude look at the strike scene north of Ban Me Thuot in the central highlands when he saw a North Vietnamese soldier standing in a bomb crater waving a white flag.

He was suspicious of a VC trick, but didn't think he should let the man get away. Unable to land his own plane in the area, he called for a helicopter pickup—and requested fighter cover just in case. Keeping the man in sight, he made a thorough recon of the area, and when an unarmed Army Huey with a two-gunship escort arrived, the Bird Dog pilot reported the area was "clean."

The young VC private was hastily loaded aboard the chopper and flown to headquarters where he told his story. He said he hadn't eaten for four days prior to capture.

COMBAT READINESS THROUGH AVIATION SAFETY

from AIRCRAFT FLEET MARINE FORCE PACIFIC BULLETIN 3750

"TIMES OF CRISIS are requiring rapid transition from readiness to commitment. Amid all the activity and excitement generated as our forces respond to challenge, there is a pervasive requirement for each unit and individual to reappraise his needs, not only in terms of men and materiel, but also in terms of attitudes and concepts. It is necessary to gear for war across the board — materially, mentally, and spiritually; but in the process, it is important to make sure that everything that is added, changed, or discarded is in fact appropriate to the necessity.

"There are people whose concept of aviation safety is to avoid maximums and minimums, to be in flight operations so cautious that neither man nor machine is ever asked for maximum output. Such people, in avoiding maximum maneuvers and precision minimums, surround themselves with a margin of comfort which they are pleased to call safety. When committed to war, stripped of their margin of comfort, they are brought suddenly face-to-face with the stark realization of their own unpreparedness. They who have in times of training and readiness moved carefully within their margin of comfort will pay a heavy price in time of war.

"There are other people whose concept of aviation safety is to pay lip-service to a paper program. In complying with the letter of instruction, they miss entirely the intent. They see the program only as a structure of restrictions, designed to slow the pace of training, to distract the focus of readiness, and to demand excessive accounting of inevitable mishaps. Such people regard contingency orders as a license to jettison aviation safety immediately and entirely. They who believe that the requirements for knowledge in training, responsibility in readiness, and accountability in reporting are to be observed only during peacetime will also pay a heavy price in time of war.

"Commanders are reminded of the twofold purpose of the aviation safety program: to educate and to conserve. We seek to employ the best techniques and procedures with the minimum loss of men and materiel. In time of combat, the need for optimum techniques and procedures is immediate, and the need to minimize loss of men and materiel is critical. Aviation safety is neither a refuge for the timid nor a stockade for the aggressive. Our goals are excellence in readiness and victory in war. To realize these goals, it is clear that the requirement to educate and conserve must acquire ever greater importance."

You are combat ready only if you can perform your mission without unnecessary destruction of your combat potential.

T53 ENGINES SCREAM FOR HELP

During a recent one year period, 14 major accidents, 2 minor accidents, 7 incidents, 29 forced landings, and 49 precautionary landings resulted from T53 engine malfunctions. These mishaps cost almost one-half of the total cost of all Army aircraft mishaps due to engine problems. To pinpoint problem areas involving the T53 engine, a survey was nade of user units. Here are some of the findings:

MAINTENANCE

Proper maintenance was found lacking in many areas. Cleaning intervals for oil filters varied from

...improper operational practices were found to be major causes for the failure of engine parts...

25 to 50 hours. In many instances, they were not properly cleaned, resulting in blocked wafer cores.

Engine strainers to bearings two, three, and four were not inspected and checked. Many were found clogged as much as 80 percent.

Numbers three and four turbine package seals and bearings were found incorrectly installed.

Contaminated oil was found in many engines. This was primarily the result of maintenance personnel storing open cans of unused oil in aircraft for later use.

In most instances, engine inlet areas were not inspected in accordance with authorized maintenance procedures. Buildups of sand, oil, etc., were found on most barrier filters. Various degrees of restriction were present. Low power complaints, due to dirty compressors, resulted in pilots increasing Standard Day settings to regain lost power. When compressors were cleaned, fuel control settings were not readjusted. Consequently, engines were trimmed 1-2 percent over Standard Day ratings.

Without first determining the cause, maintenance personnel were arbitrarily adjusting oil pump pressure relief valves whenever they noted a change in oil pressure. Teflon chips from lines, restricting oil flow to the coolers; kinked lines, restricting oil flow; and oil filters in the bypass position were found to be the main causes of oil pressure drops.

UNSCHEDULED ENGINE CHANGES

Foreign object damage was found to be one of the most common causes for engine changes. It resulted from dust, sand, poor housekeeping, and the ingestion of aircraft fasteners. The Dzus fastener on the squirrel cage was frequently involved. It was found that when a Dzus fastener failed and was ingested by an engine, the engine was removed for repair or overhaul, another engine installed, and the Dzus replaced. *But, in most instances, the remaining fasteners were not checked. Most were worn and had a short life expectancy.* If the Dzus fasteners were replaced periodically, the chance of engine failure from this cause would be greatly reduced.

Other causes of premature engine changes were sand erosion, bearing failures, defective fuel controls, short shaft failures, hard landings, overspeed conditions, hot starts, and high engine temperatures.

IMPROPER OPERATIONAL PRACTICES

The following improper operational practices were found to be major causes for the failure of engine parts:

Use of the emergency system of the fuel control during normal flight with an output shaft speed of 6,700-6,750 rpm.

NOTE

The N2 or output shaft speed is redlined at 6,600 ± 50 rpm. The 6,700 ± 50 rpm is available as a trimming adjustment to maintain 6,600 ± 50 rpm N2 at an altitude in excess of 6,000 feet and should not be used below 6,000 feet altitude, or above 85% N1 speed.

Use of the emergency fuel control system during starting and positioning the throttle to control EGT.

Allowing N1 to deteriorate excessively when checking the emergency fuel control system prior to flight and switching to automatic with increased throttle, causing high EGTs and possible hot section damage.

Failure to stabilize EGT at flight idle prior to engine shutdown. After flying prolonged periods, particularly with an engine rated 2 percent above Standard Day, temperature soak-back is critical.

Flying aircraft loaded above allowable gross weight.

PART REPLACEMENT

The most common engine parts replaced were carbon seals, vaporizer seals, compressor blades, N1 wheels, combustor liners, N1 nozzles, power turbine packages, and deflectors (curls). Replacement of these parts was often compromised by lack of adequate tools. Some units had no bearing package tools for numbers three and four bearings, compressor blade replacement tools, or fixtures for replacing combustor liners.

A potential problem area concerning interchanging of T53-L-9/9A and T53-L-11 power turbine packages was also noted during this survey. In many instances, serviceable parts were removed from high time unserviceable engines and installed on low time serviceable engines. There is evidence that many engines now in service have components with a TSN (time since new) of 1,500-2,000 hours. This practice invites component failure and unnecessary engine problems.

ARMY MAINTENANCE TEST PILOT COURSE

the course teaches pilots the inherent qualities and vibrations of a mechanically sound aircraft and a step-by-step flight checkout after maintenance

SIX HELICOPTER pilots, five officers and one civilian, comprising the first class to attend the new UH-1 Maintenance Test Pilot Course, graduated at the Bell Service Training School, Fort Worth, Texas, 22 July 1966.

Designed to improve aircraft reliability, to increase safety and availability, and to cut maintenance costs by early detection and repairs, the two weeks course is maintenance oriented. Divided into two sections, the course provides 40 hours of classroom instruction and 40 hours of practical experience. Though included in the practical portion, flying is not a primary function of the course. Basically, the course teaches pilots the inherent qualities and vibrations of a mechanically sound aircraft and a step-by-step flight checkout after maintenance. After satisfactory completion of the course, each student is awarded a graduation certificate from the U. S. Army Transportation School and a permanent entry, qualifying him as a UH-1 maintenance test pilot, is made on his DA Form 759.

Classes are necessarily small, each presently limited to six students. Twenty such classes are scheduled for FY 1967, the first three at the Bell Service Training School and the remainder at the U. S. Army Transportation School, Fort Eustis.

Test flight accident costs accounted for a dollar loss of $4.3 million during the past four fiscal years. Because of new and more expensive aircraft, these

MAINTENANCE TEST PILOT

costs have grown year by year — $58,000 during FY 1962; $195,000 during FY 1963; $600,000 during FY 1964; and $3.5 million during FY 1965.

A check of the reports for these accidents showed that most were not due to any lack of flying skill on the part of pilots, but on their lack of understanding of aircraft systems. Typical is a U-8 test pilot who took off after the landing gear warning horn sounded. He wanted to complete the test flight and thought the cause was a maladjusted throttle limit switch. As the aircraft became light on its wheels, the gear folded and the U-8 settled on its belly. The cause was a defective landing gear selector switch — not a maladjusted throttle limit switch. The safety switch prevented gear retraction as long as the aircraft's weight held the gear struts compressed. The horn had beeped its warning as designed, but was misinterpreted by the pilot.

Selection of the UH-1 for the initial Army Maintenance Test Pilot Course was made on the basis of its universal use throughout the Army. As one officer stated, "If you are a rotary wing pilot, you are now flying UH-1 aircraft or you soon will be."

The Bell Helicopter Company was chosen to develop the course, and Bell instructors are to conduct the first five classes — three at the Globe Plant, Fort Worth, and two at Fort Eustis — to aid in transition of the school. Special emphasis was placed on instruction methods and preparation of text to develop a compact, thorough, and comprehensive course. These tasks were assigned to Ron Erhardt, Bell's chief instructor pilot, and Dean Stravato, chief ground instructor and senior technical representative. Stravato recently completed a three year assignment in Vietnam. Other Bell instructors for the course are Jack Bell, instructor pilot, and Tony Steir, Bell Service Department. Steir's job is to put defects in aircraft for trainees to find.

To qualify for this course, prospective students must have logged a minimum of 1,000 hours rotary wing flying time, 250 of which must have been in UH-1 helicopters, and must have served as maintenance officers for a period of one year or longer. Waivers for these minimum requirements may be obtained through USCONARC, providing an individual possesses other related qualifications. The need for an extensive flying and maintenance background is illustrated by the instruction for the UH-1 fuel control unit. This unit is covered entirely in one hour of classroom instruction, including function, operation, adjustment, effect on related systems, results of failures of components, manipulation of controls, improper adjustment, etc.

Ability of the instructors to advance the students at such a rapid pace is due largely to the design of the students' two texts. The classroom manual includes photos of every drawing, picture, chart, and transparency the instructor will use, in addition to explanatory information. The page opposite each photo is provided for student notes. This text, which becomes the property of the student, follows the course outline exactly as the material is presented in the classroom. If a student has a strong maintenance background of UH-1 aircraft systems, is attentive, and makes notes, he will have all pertinent information permanently recorded *for later study on his own time.* In this way, classroom time is greatly reduced.

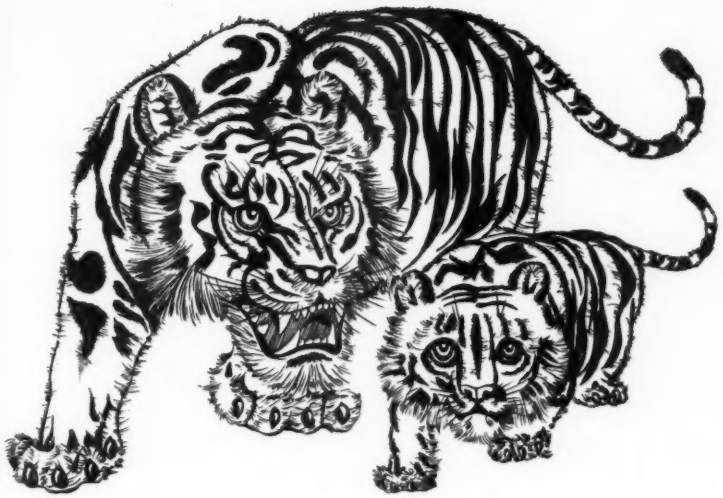
The second manual is in the form of a knee board and consists of two sections: The first is the flight section, covering all aspects of flight; the second, a troubleshooting guide to be used in conjunction with the flight portion. With knowledge gained in the classroom, a student, using this "flip" type guide, can virtually pinpoint any problem or problem area. Use of this manual doesn't end with the course. It becomes the property of the graduate for use on all test flights. Pages can be readily replaced and change sheets will be provided periodically to all graduates.

Because engineering changes may alter normal vibrations of a helicopter, or change symptoms of defective components, maintaining a current troubleshooting guide is a necessity. Before any major change proposal is adopted for UH-1s, the Army Transportation School will be informed of the proposal and its effects. A change or supplement to the troubleshooting guide will then be prepared and distributed.

The effectiveness of this guide in the hands of a school trained pilot was demonstrated by one of the first class graduates when he encountered a "wild cyclic." From knowledge of the systems, gained in the classroom, and the aid of the special guide, he not only correctly diagnosed the trouble as *servo failure* but accurately determined it to be due to *overtorquing* of a nut on the *pilot valve,* and pinpointed the *nut.* Needless to say, this diagnosis exceeded the expectations of the instructors and the intent of the course, but it illustrates what proper training can accomplish.

What was Bell's opinion of the course? The answer came in the form of a directive requiring all future UH-1 factory pilots to be school graduates.

Army plans call for contracts with additional manufacturers to design similar courses for the newer and more complex aircraft in the Army inventory, including the CH-47.



How important is this thing called personal influence... and how does it concern Army aviation?

PERSONAL INFLUENCE... POWER FOR PREVENTION

Ted Kontos

TAKE A PACKAGE of common sewing needles and dump them on a table. What happens? They point in different directions. Now take the same needles, expose them to a strong magnetic field, suspend them so that they are free to move, and watch as they oscillate and finally stop, each pointing in the same direction.

We are all familiar with this type of magnetism. In the compass, it guides us. In the generator, it furnishes us with electric power. Whether or not we realize it, it has a pronounced effect on our lives. But there is another type of magnetism — a powerful, invisible force that also affects all of us. We call it personal influence.

A comparison of these forces shows that both possess remarkable similarities, but there is one important difference — unlike the needles which, magnetized and freed, function constructively as a navigational aid, a person under the influence of others may or may not work in a beneficial manner. This influence can be transmitted in numerous ways: by instruction and by example; by a positive attitude, or complete indifference to a given situation; and by request or command, coupled with some form of supervision. A classic example concerns the hunter who accidentally shot a farmer's cow. He hadn't intended to buy the cow, but the farmer, armed with a shotgun, had a profound influence on his decision to do so.

PERSONAL INFLUENCE

How important, then, is this thing — this magnetic power — called personal influence? And how does it concern Army aviation?

Some time ago, crewchiefs in one aviation unit made a practice of using hand operated water type fire extinguishers filled with aviation gasoline to hose down dirty engines. It was a quick and effective cleaning method. Many school trained mechanics as well as OJT trainees received their first practical maintenance experience in this unit. This cleaning procedure was quickly stopped after two aircraft on the wash rack mysteriously burned late one night. Among the debris, investigators uncovered the charred remains of a hand operated fire extinguisher.

In another unit, a crewchief discovered that he could cure excessive magneto drop on an R-1340 engine by adjusting the breaker points. It wasn't long before the rest of the flight line mechanics were doing the same thing. The result was a rash of engine problems and pilot writeups.

The commander of another aviation unit demanded a higher aircraft availability rate. The mechanics obliged by taking every maintenance shortcut they could devise. For cleaning, new spark plugs were sloshed in a bucket of fuel drained from the aircraft; spark plug bushings in the cylinders were not cleaned with a tap before new plugs were installed. Antiseize compound was applied indescriminately on plug threads. If they happened to be handy, torque wrenches might be used during plug installation. Did this type of hurry-up maintenance increase aircraft availability? Only on paper, and for a short period. The end result was an increase in number of pilot writeups, aborted missions, and spark plug changes.

These are not isolated instances. We continue to have the same kind of problems year after year. How many mishaps have occurred because:

A mechanic failed to properly torque a nut?

An MWO was not complied with?

An inspector was lax?

A connection was left loose?

A cotter key was omitted?

Bad habits are not taught in the classroom. A student mechanic is *not* shown how to torque without a torque wrench. He is *not* instructed to force a part in place if it won't easily fit. He is *not* allowed to place an aircraft on jacks in an open area where wind can knock it off. He is *not* allowed to service an aircraft without first grounding the aircraft and the servicing equipment. He is *not* encouraged to perform maintenance without referring to appropriate TMs. He is *not* allowed to run up an aircraft unless it is in a designated runup area, or to taxi in a congested area without wing walkers. . .

What, then, influences an individual to disregard the correct procedures taught him, and violate regulations? Nor is the mechanic the only one caught in this trap. Pilots and other aviation personnel are equally susceptible.

Nearly 25 years ago, a pilot decided to buzz his home. A friend joined him in another aircraft. During one pass, their wingtips touched and both aircraft crashed, demolishing several houses.

Five years ago, a student pilot flew over his girl friend's house and proceeded to put on a one-man airshow, *as he had stated he would.* For his grand finale, he came in low, rolled the aircraft inverted, and promptly nosed into the ground.

Rotary wing aircraft are also involved in this type of accident as evidenced by an aircraft commander who crashed a helicopter with a full crew aboard in a residential area while circling low over a city. Just prior to the crash, he was heard to say: "This is where she lives."

Over 10 years ago, a pilot lifted off from a closed airfield into a solid overcast. He was in a hurry to transport two passengers. He crashed a few miles away.

A few months ago, a pilot took off in IFR weather on a VFR flight plan. Severe turbulence, thunderstorms, and possible tornadoes were forecast. He crashed a few minutes later.

Another pilot, on his way to airlift an expectant mother from a snowbound area, continued his mission even after he could not see because of heavy snow. The result was a fatal crash.

During each of these missions, or prior to them, others knew of the pilot's intent. Yet, no one made an effort to prevent any of these flights or even advise against them. Was a negative attitude, or silence, taken to mean consent? One thing is certain: analysis of these and other mishaps clearly establishes the human element as the predominant accident cause factor.

True, a particle of dirt can slip past a fuel filter, lodge in the carburetor, cause fuel starvation, and loss of engine power. This has happened. But what about the pilot who flies on the auxiliary tank, thinking he is on main? When his engine fails, he mechanically positions the fuel selector to auxiliary. Since the selector is already in that position and the tank dry, he is unable to make a restart and crashes. The aircraft is destroyed. This also happened recently.

We don't do anyone a favor when we fail to point out his deficiencies...

While circling low over the city, pilot was heard to say, "This is where she lives"

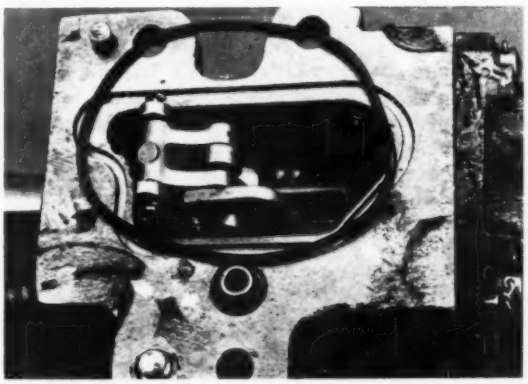
Engine and materiel failures often occur in combination. Even in these instances, the human element is frequently the responsible agent. One UH-1 engine failure resulted in one fatality, four serious injuries, and one minor injury as well as the destruction of the aircraft. It was caused by fuel starvation due to materiel failure of the fuel control pin. Laboratory analysis, however, revealed that oil and fuel resistant grease had been applied to the overspeed governor mounting pad. This grease had entered the fuel control unit, settled on the flyweights, and created an overspeed condition that, in all probability, overstressed the pin, causing it to fail.

Numerous other UH-1 mishaps, including a fatal one that killed six and injured three, have happened because a quick disconnect fuel coupling was improperly secured by maintenance personnel and not checked during preflight.

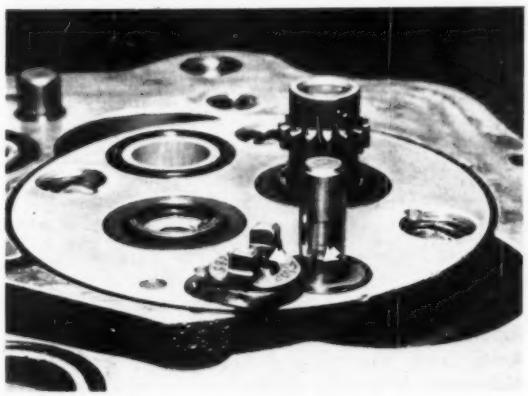
Accident investigators attributed one accident involving weather to "an act of God." In reality, the pilot attempted to take off with a quartering tail wind, mistook groundspeed for airspeed, stalled and crashed.

What about wire strikes? Flying below minimum altitude in violation of unit SOP, failure to perform ground or air reconnaissances before landing at unfamiliar strips, failure to mark locations of known wires and obstructions around an active airfield are just a few causes of wire strike accidents.

Since bad habits are not taught, how do they develop? Is it left up to each individual to figure



Gas and oil resistant grease applied on overspeed governor mounting pad . . .



. . . settled on flyweights, causing failure of pin

PERSONAL INFLUENCE

out how to violate regulations; disregard TMs, checklists, procedures; and take unnecessary risks? Or does he get assistance from others? In far too many instances, the human error can be traced to *direct or indirect personal influence.*

A *hurry-up-and-get-plane-ready-I-don't-want-the, general-to-be-kept-waiting* attitude cost one aircraft and several lives, including the general's.

A simple *"They're rated"* paired two inexperienced pilots for an administrative flight in a CV-2. The price? One Caribou.

The same result was attained by a *"He's-instrument-rated-so-put-him-on."*

An *I-can-catch-up-on-my-sleep-later* attitude cost another pilot his life.

The veteran pilot who likes to display his ability to perform low level maneuvers, disregard checklists and procedures, violate regulations, take unnecessary risks, etc., is going to entice some new pilot to do likewise. Where the veteran pilot may get by on skill, the fledgling most probably will not. Eventually, the veteran will likely fall victim to a situation of his own creation.

A few years ago, a training plane from a military installation made headlines when it smashed into the side of a bridge while supposedly in a landing pattern. Could the discovery that other pilots frequently tested their skill by flying under the bridge have had any bearing on this accident?

Can flying be 100 percent safe under all situations? Not any more than crossing the street, or driving to work. In a combat environment, risk becomes an integral part of every mission. Marginal weather cannot be allowed to stop a flight necessary to evacuate wounded, or to supply reinforcements and equipment to men cut off from their unit by the enemy.

During World War II, a damaged C-47 was badly needed to evacuate personnel before advancing Japanese troops. For lack of a spare wing, it was fitted with one from another type aircraft. Fortunately, the "gooney bird" flew and saved a number of lives. Had it crashed, would the fate of those aboard been any worse than at the hands of the enemy? But who, in his right mind, would authorize such a repair under less demanding circumstances?

Valor, coupled with training, experience, and ingenuity is a major factor in winning battles and saving lives. But valor should never replace common sense. We must always bear in mind that the new aviator, particularly the younger man, is endowed with an overabundance of vitality, curiosity, and an adventurous spirit. *There is nothing he can't do* — particularly if he is encouraged to do it, has seen it done, or is left to his own design while he gains experience.

Pilot exhausted fuel in auxiliary tank and bailed out. Main tank was full

Influence should begin at the top. The commander who is conscientious, follows prescribed procedures, abides by regulations, and exercises good judgment, sets, by example, the course for his subordinates to follow. If he is lax, if he is guilty of breaking or bending regulations, if he does not select pilots to fit mission requirements, if he does not concern himself with conditions around his airfield, if he does not insist upon each individual doing his job efficiently and in a professional manner, then he has lost his sense of direction. In time, those following him will lead others down the same path.

A few months ago, a pilot was commended for his skill in landing a crippled aircraft which had broken a gear and damaged the wing strut when it had hit a large rock on a field strip during a landing attempt. Certainly the pilot deserved a pat on the back. He earned it. BUT, at the same time, someone should have pointed out that:

- Had he made a reconnaissance of the unfamiliar airstrip before his first landing attempt, he would have seen that it was unsuitable for use.
- After he struck the rock, extensively damaging the gear and wing strut, he should not have become airborne again.

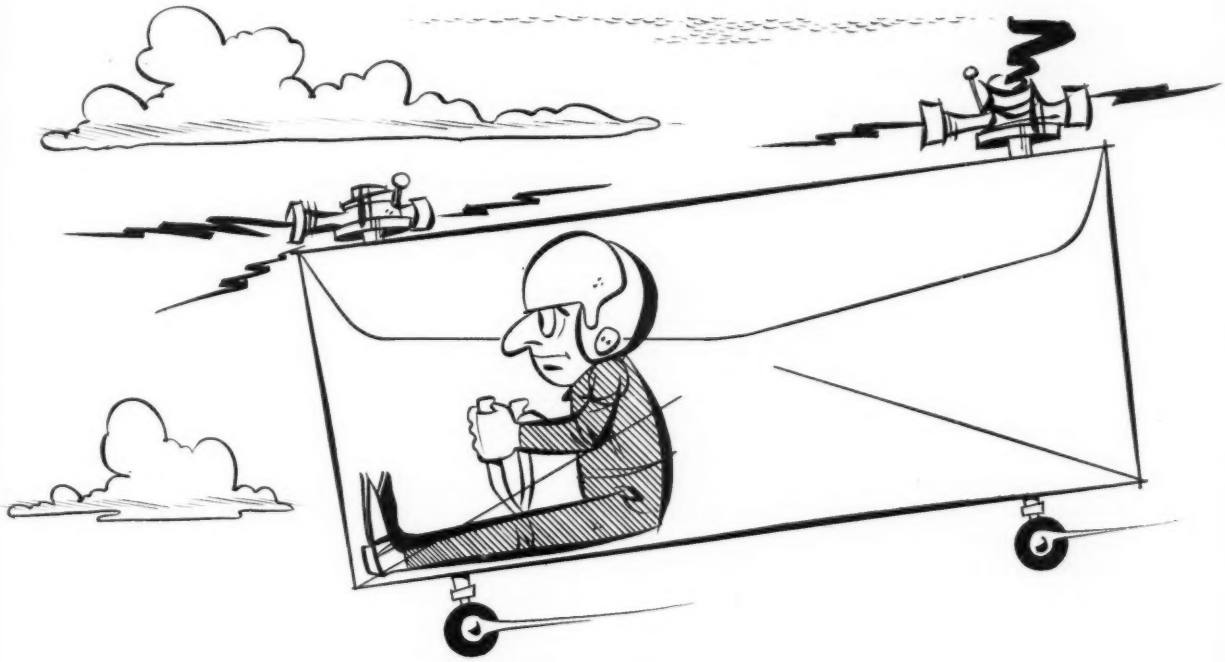
We don't do anyone a favor when we fail to point out his deficiencies. This man was exceptionally lucky the wing stayed on.

By our actions and words, by our refusal to lend the stamp of approval to improper methods or procedures, by the example we set, all of us have the power to prevent accidents through personal influence.

...this pitch is about life, yours and the components of the helicopter you fly...

THE REAL PURPOSE of this pitch is to talk about life – yours and the components on the helicopter. In arriving at the conclusion that you must stay within the published flight envelope to protect yourself, fellow pilots who will later fly the aircraft, and the dynamic components of the aircraft, we will take you through the complete cycle

L. H. Fichthorn
Vertol Division of Boeing Aircraft Company



Life And The Pursuit Of The Flight Envelope

FLIGHT ENVELOPE

used in determining the flight envelope. In doing this we will cover the following subjects:

Mission profile (chart 1)

Component fatigue strengths (chart 2)

Fatigue loads (chart 3)

Flight envelope (chart 4)

The programmed cyclic trim envelope (figure 7-4, page 7-13, chapter 7, section II of TM 55-1520-209-10, 1966)

Retracted cyclic speed trim envelope (figure 4-5, page 4-27, chapter 4, section IX of TM 55-1520-209-10)

Maximum altitude capability chart—Safety of Flight Supplement — (change 5 of TM 55-1520-209-10)

MISSION PROFILES

When the requirement for a helicopter, or any aircraft for that matter, is originated, a set of military characteristics is established as the basis for design. From these military characteristics, flight profiles are determined which are based on past experience in service use and on the projected use of the new aircraft.

In the case of the CH-47A Chinook, the original specification profile, as determined from the military characteristics, is shown in the shaded area of chart 1. From this chart you will see that there are percentages assigned to cover both the steady state flight conditions, and the transient flight conditions, from takeoff to landing. The chart shows that the original specification profile called for spending 92.5 percent of the time in steady state flight conditions and 7.5 percent of the time in transient flight conditions.

On the basis of this original specification profile, the helicopter and its dynamic components were designed, tested, and put into operational use. However, after a period of time in operational use, some problems started showing up in the form of

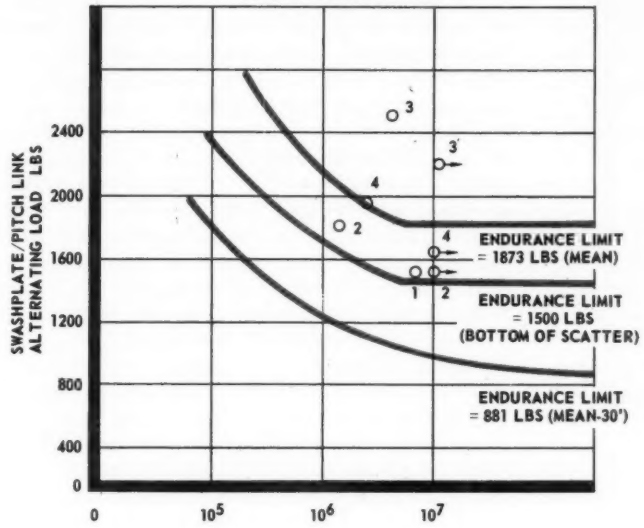
CHART 1

CH-47A MISSION PROFILES

PERCENT OF FLIGHT TIME OR MANEUVERS PER HOUR

STEADY STATE FLIGHT CONDITIONS	SPEC PRO-FILE	NEW PROFILE 25,000 LB 50% TOTAL 28,000 LB 10% TOTAL	NEW PROFILE 33,000 LB 40% OF TOTAL	TRANSIENT FLIGHT CONDITIONS	SPEC PRO-FILE	NEW PROFILE 25,000 LB 50% TOTAL 28,000 LB 10% TOTAL	NEW PROFILE 33,000 LB 40% OF TOTAL
GROUND CONDITIONS	1.5			MANEUVERS		MANEUV. PER HR.	MANEUV. PER HR.
HOVERING	10.0	10.0	10.0	CYCLIC & COLLEC-			
FWD FLT POWER ON				TIVE PULL-UPS	0.5	(4)	(4)
CRUISE (91.5% V_H)	50.0			CHANGE TO PPD	0.5		
LEVEL FLIGHT				RIGHT TURN	1.5	(5)	(5)
TRANSITION (20-40 KTS)	10.0	15.0	15.0	LEFT TURN	1.5	(5)	(5)
60% V_H		25.0		YAWING	0.5		
70% V_H			25.0	FLARE	1.0	(4)	(4)
90% V_H		40.0	20.0	REVERSALS			
100% V_H	10.0	5.0	20.0	LATERAL		(4)	(4)
110% V_H		5.0	10.0	LONGITUDINAL		(4)	(4)
MAX POWER CLIMB	6.0			DIRECTIONAL		(4)	(4)
SIDEWARD FLT @ 20 KTS	0.5			AUTOROTATION &			
REARWARD FLT @ 20 KTS	0.5			PARTIAL POWER			
AUTOROTATION &				DESCENT			
PARTIAL POWER				RIGHT TURN	0.5		
DESCENT				LEFT TURN	0.5		
STEADY DESCENT				CYCLIC & COLLEC-			
AT 1000 FPM	4.0			TIVE PULL-UPS	0.5		
				FLARE	0.5		
	92.5%	100.0%	100.0%		7.5%		

CHART 2
TYPICAL L-N CURVE
SWASHPLATE/PITCH LINK



the end product of a fatigue test program is the determination of the "endurance limit"

premature failures of some of the dynamic components. This led to a review of the flight profiles actually being flown in operational use versus the original specification profile. This review showed that the flight profiles actually being flown were more severe than those in the original spec profile. As a result, the flight loads actually experienced were greater than those used in the original computation of component lives. This then led to the determination of a new profile which is based on actual flight profile experiences.

In chart 1, the new spec profiles are shown for three different gross weights: the so-called light gross weight (25,000 lbs), the design gross weight (28,000 lbs), and the maximum alternate gross weight (33,000 lbs).

At this time we must add that, while the U. S. Army was flying the helicopter in operational use, there was also much action going on with experimental helicopters at the Boeing-Vertol Flight Test Center. One of the critical programs was a structural demonstration program which was really a continuation of the structural demonstration program that got the helicopter released for flight and operational use. Out of this structural program came the knowledge that some flight conditions, originally considered as being significant, were now determined to be not as critical. In the final analysis it was the combination of flight test data and operational data which led to the new flight profiles. The changes from the original profile can readily be seen by comparing the columns of chart 1.

One very significant thing which should be pointed out specifically is that the new profile includes allowances for time spent inadvertently outside the flight envelope. This is shown in chart 1 as 110 percent V_H. This is one way that a safety factor has been built into the helicopter. Another significant change from the original spec profile is that the transient flight conditions have been expressed as a specific number of maneuvers per flight hour instead of as a percentage.

COMPONENT FATIGUE STRENGTHS

Now we get into the heart of actually showing how the strengths and lives of the helicopter dynamic components are determined, and here a few words are in order about this word "fatigue."

Fatigue in the human body and in helicopter dynamic components is analogous, meaning that if allowed to progress, the body will eventually break. The one major dissimilarity is that, with the human body, the on-set of fatigue is noticeable and can be corrected through medical attention. Fatigue in a helicopter dynamic component is an insidious thing because you can't see it until it has manifested itself as a break, and then it might be too late.

FLIGHT ENVELOPE

It might help to visualize what a dynamic component looks like on the inside and what happens to cause a fatigue failure. Assuming that the component has absolutely no defects to begin with, the molecules within the component are arranged in a very orderly fashion, that is, none are "out of line." This is where the component gets its strength.

Now, if you subject that component to a load such as a sharp bang, bend, or twist, you stand a chance of disarranging the orderly lineup of the molecules. This is really the start of fatigue, and the final failure can happen in a very short time, or it might not occur for a very long period of time. The thing to remember is that fatigue damage is cumulative; that is, after the first bang, bend, or twist has been induced, each succeeding bang, bend, or twist adds to the damage.

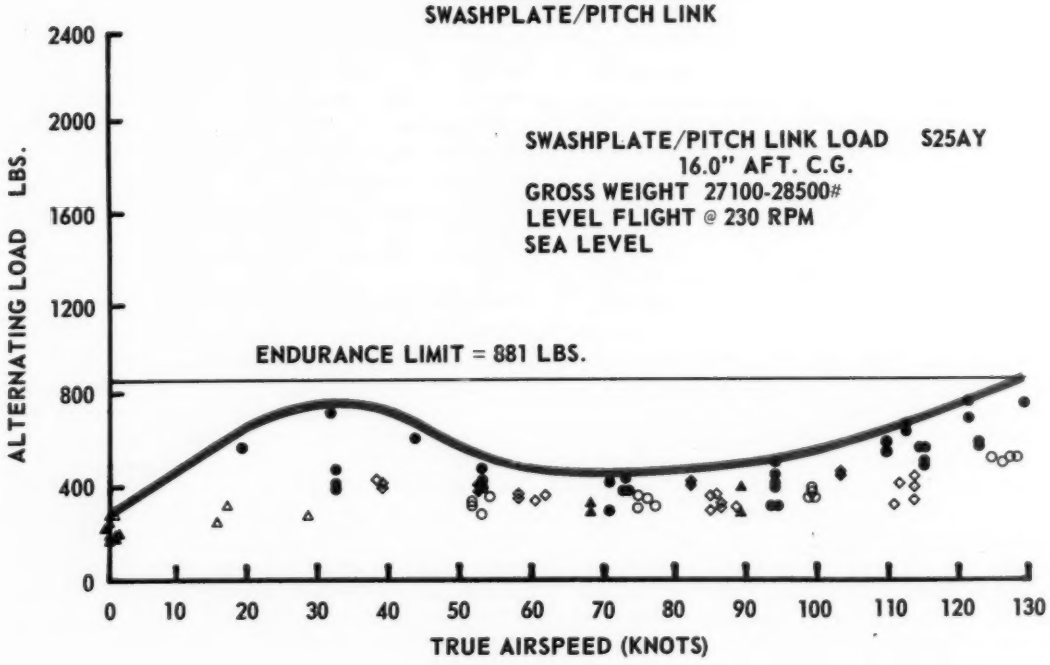
After the helicopter design is completed, test components are procured well in advance of actual production components. This first set of test components is put into what the industry refers to as a "bench fatigue test program." Insofar as possible with hydraulic jacks, shakers, tilters, and whirlers, the components are subjected to simulated flight loads. These are referred to as "alternating loads" because the components experience many repeated loads from sources such as blade flapping, changes in lift and drag, and dynamic system imbalances. The magnitude of the loads is a function of airspeed, center of gravity (c.g.) location, gross weight, and maneuvers being performed.

The idea is to have the complete set of samples of each dynamic component "run out," that is, never fail in the course of the fatigue test program. However, experience shows that due to imperfections in raw materials, manufacturing process, and the like, all the components are not of the same (100 percent) quality. Therefore, what actually happens in the fatigue test program is that there is a scattering of component failures and components that go to "run out."

The end product of a fatigue test program is the determination of the "endurance limit." This is the load limit which, if never exceeded, means that that component should never break.

Chart 2 shows how the endurance limit was derived for the swashplate/pitch link combination for the Chinook. The numbers shown on the chart

CHART 3
TYPICAL FLIGHT LOADS
SWASHPLATE/PITCH LINK



are real, and the final endurance limit of 881 lbs shown on the chart is the actual endurance limit for the Chinook swashplate/pitch link combination.

You will notice from chart 2 that there were four failures as follows:

One at an alternating load of 1,800 lbs at 1,400,000 cycles.

One at an alternating load of 1,950 lbs at 3,700,000 cycles.

One at an alternating load of 2,500 lbs at 5,000,000 cycles.

One at an alternating load of 1,500 lbs at 8,000,000 cycles.

You will also notice from chart 2 that there are three circles with arrows at 10,000,000 cycles. These three circles indicate components that reached 10,000,000 cycles, at the loads shown on the chart, without failing. That is, they reached "run out."

On the basis of this sample of swashplate/pitch links then, the three endurance limit curves are plotted as shown in chart 2. The uppermost of the three curves is the "mean endurance limit" equal to 1,873 lbs, and is derived simply by adding up the alternating loads for the seven samples and then dividing that number by seven.

However, as you can see by again referring to chart 2, two samples actually failed at endurance limits below 1,873 lbs. This is not considered to be an adequate margin of safety, thus we derive the middle curve which is called the "bottom of scatter" endurance limit, which in this case is equal to 1,500 lbs. This number, 1,500 lbs, is actually as described; that is, the "bottom" or lowest alternating load of the seven samples tested.

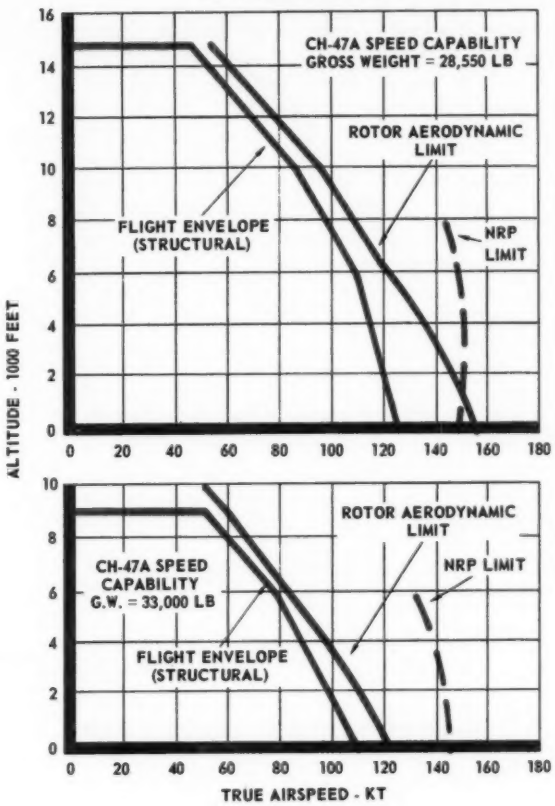
Now, you can rationalize that on the basis of seven samples you have demonstrated that no swashplate/pitch link combinations should fail as long as the endurance limit of 1,500 lbs isn't exceeded. However, theoreticians and statisticians will tell you that seven is a very small sample and perhaps not indicative of the universe; that is, the complete population of swashplate/pitch link combination. To account for this, probability theory is applied.

In the helicopter industry, the expression "triple 9 eight" (referred to by statisticians as the three sigma value) is used. This means that for the whole population of swashplate/pitch link combinations 99.98 percent should never fail as long as the endurance limit isn't exceeded. The curve expressing this is the bottom of the three curves in chart 2, which shows that the endurance limit for the swashplate/pitch link combination on the Chinook is 881 lbs.

As you can see by referring to the third curve in chart 2, the number 881 lbs is actually derived by subtracting the 99.98 percent probability load from the mean load of 1,873 lbs derived in the uppermost curve. This tells you that the 99.98 percent probability load is 992 lbs, and further shows you that there is now a pretty good safety margin built in by assigning 881 lbs as the endurance limit.

CHART 4

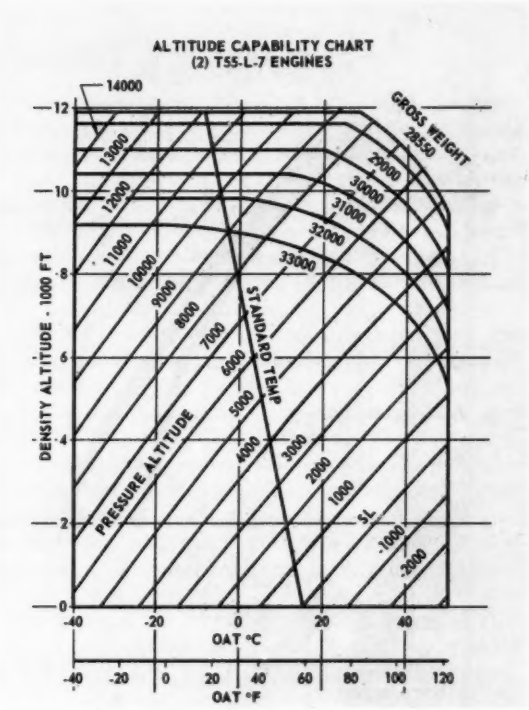
CH-47A FLIGHT ENVELOPE



FATIGUE LOADS

Once the bench fatigue test program has established that a component is safe for flight, the next step is to actually conduct a flight test program. In the course of conducting this flight test program, the steady state and transient flight conditions, as defined in the military characteristics and the detail spec, are actually flown, and through special instrumentation, actual flight loads are measured.

Chart 3 shows the actual alternating loads versus true airspeed which were experienced on the flight test aircraft. You must bear in mind that this chart represents only one flight condition, namely 28,500

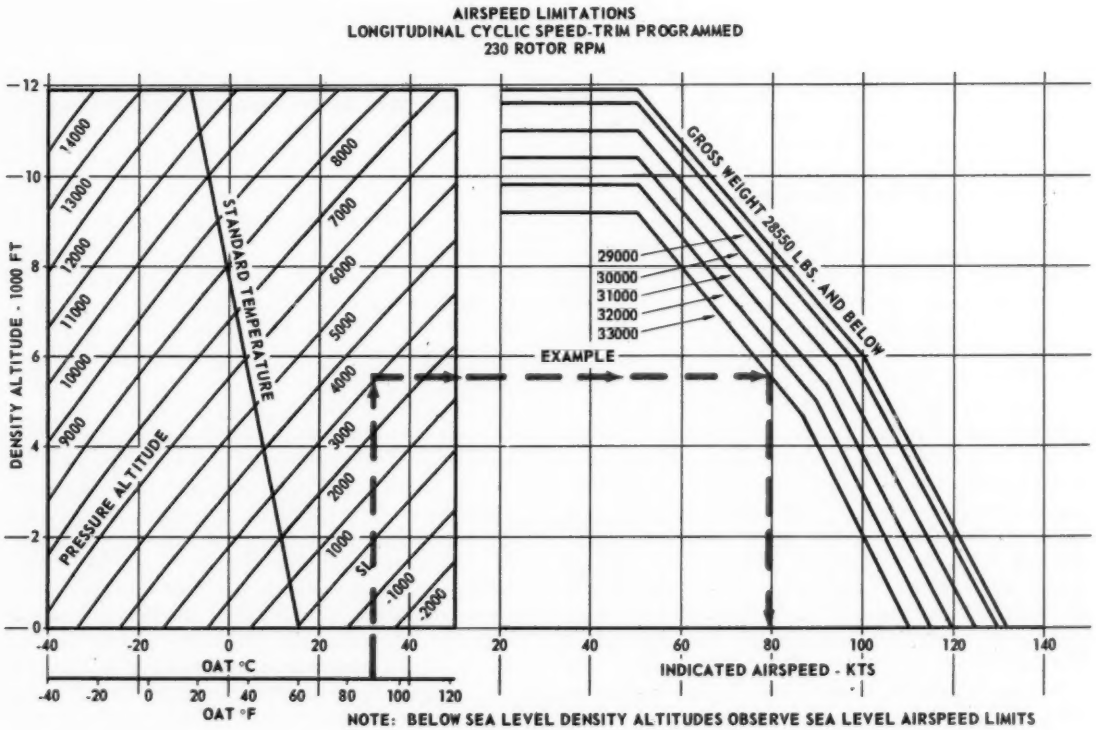


FLIGHT ENVELOPE

lbs gross weight, 16.0" aft center of gravity (c.g.), and level flight at 230 rpm at sea level, all reduced to the standard 59° F day.

From chart 3 you can easily see the segments of the flight regime which impose the highest loads. These would be the transition region of 20-45 knots, and the increasing airspeed region beginning at 100 knots. The key feature of chart 3, however, is the airspeed at which the alternating loads reach the endurance limit of 881 lbs. That point establishes the "Velocity Never Exceed" (VNE). In this case, the VNE is 130 knots true airspeed at sea level on a 59°F day at 28,550 lbs, 16.0" aft c.g. This is the Chinook VNE for that condition.

If you were to extend the curve on chart 3, you would of course exceed the 881 lbs endurance limit, and now you would be eating into the safety factor and possibly starting that insidious accumulation of fatigue damage.



The unfortunate part about the 130 knot VNE is that the Chinook has much more capability than that. A look at the flight envelope on chart 4 will confirm this. Chart 4 is laid out to show three altitude/airspeed limits.

The first, which is labeled the "Flight Envelope (Structural)," is the flight envelope determined from the bench fatigue test program and the flight loads program. To reiterate, this is the envelope within which the endurance limit will never be exceeded. The next line on chart 4 labeled "Rotor Aerodynamic Limit" is what you might better know as blade stall. As you can see, the rotor system is capable of taking the helicopter to higher airspeeds. The third line on the chart labeled "NRP Limit" is the engine normal rated power limit and again shows you that the engines are capable of taking the helicopter to higher airspeeds.

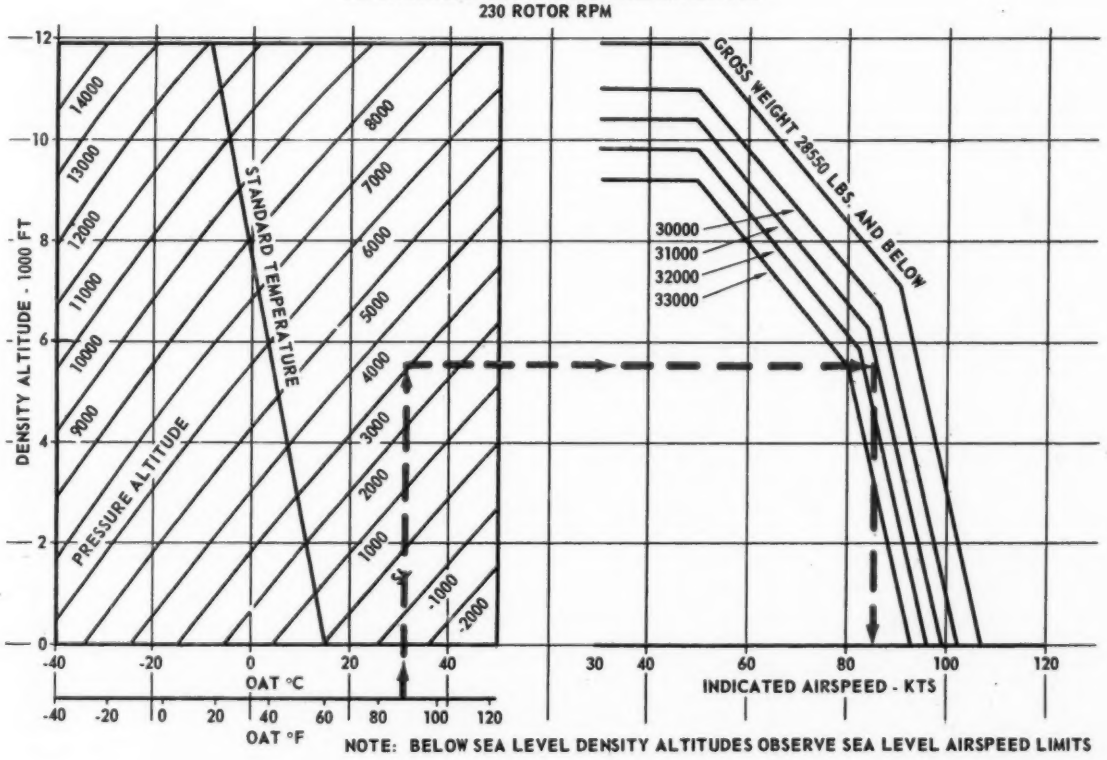
With all this knowledge then, it falls right back on the pilots to restrict themselves from making the helicopter do what we know it's capable of doing. You somehow have got to keep in mind all the time the insidiousness of fatigue damage—you can't see it, feel it, or hear it until something breaks.

In anticipation of your question, "What can be done to allow the helicopter to use all of its capability?" there are programs underway to strengthen, or otherwise relieve the loads on, those components which presently restrict the VNE to 130 knots.

Finally, there are three charts which you should have indelibly inscribed in your mind:

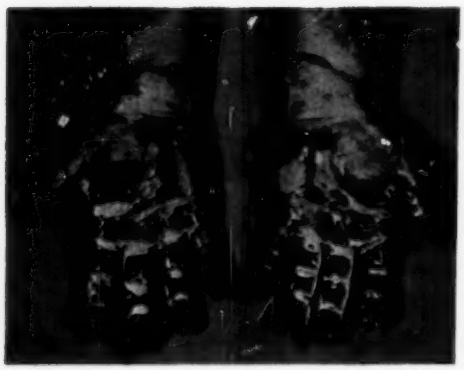
programmed cyclic trim envelope,
retracted cyclic trim envelope,
maximum altitude capability chart.

While the charts shown are Boeing-Vertol Tandem Notes, the information is identical with figures 7-4, 4-5, and Safety of Flight Supplement, change 5, respectively, of TM 55-1520-209-10. In conjunction with these three charts, you should become an expert in the use of the VNE computer which is installed in the cockpit of the helicopter. Thorough knowledge of the —10 charts and the use of the VNE computer will help you remain within the flight envelope and thus prevent the accumulation of fatigue damage which could lead to the loss of a helicopter and lives.

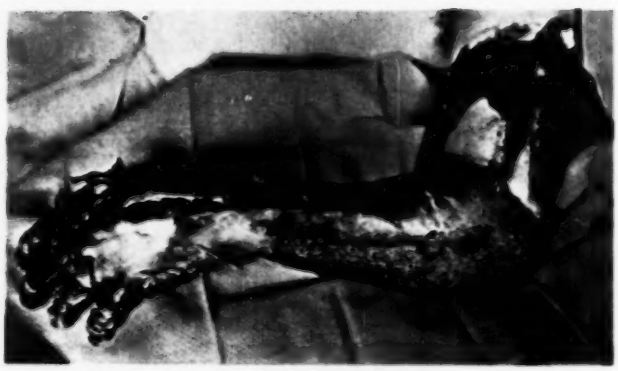


Gloves and Sleeves?

NO GLOVES



GLOVES, SHORT SLEEVES



NO GLOVES, SHORT SLEEVES

GLOVES AND SLEEVES

. . . the choice is yours!

Bye Bye Buf

Auf wiedersen Annyong-hi ka-sipsio Tu gia

Captain Gregory Schrand

BUF—BIG UGLY FELLER; that's the nickname that was hung on the CH-37 when Igor sold the first six to the Army. Now, of course, bigger and uglier fellers are around to take her place, but ugly or not she looked good to those who flew her, and a lot was learned about big helicopters from her.

Big, however, is only a comparison. Back in '57, the BUF was big when she was being compared to the CH-21 or CH-34. Now, though, that sizeable difference has certainly diminished by comparison to the CH-47 or CH-54. So, BUF has run the gauntlet from queen of the inventory to the obsolete recovery ship of Vietnam, and is now to be transferred to the National Guard.

It really hasn't been a long career for the BUF. It started about 1957 when she was the first aircraft to undergo the 1,000 hour logistical evaluation. In the six months it took to complete the evaluation a number of modifications were made, and eventually around 1961 the B model emerged which we have today.

After the 1,000 hour evaluation, personnel were trained to man the new medium helicopter companies. (Notice they called her a medium helicopter.) The 4th Transportation Company was formed at Fort Benning first, then came the 90th at Fort Knox, the 19th at Fort Benning again, and finally the 54th at Fort Sill. Two of the companies were transferred to Europe and one to Korea and are still there today.

In May 1963, A Flight of the 19th Transportation Company was sent to Vietnam to experiment in aerial recovery of downed aircraft. She was the first aircraft to be used solely for recovery in Vietnam, and although the job expected of her was beyond her capabilities, she managed to hold up under the strain. In the time the BUF was in Vietnam she recovered at least one of every type aircraft then in the country. During these recoveries "big" was again pretty evident when the BUF's silhouette was a much more lucrative target than her armed Huey escort.

Each of the recoveries is a story of its own, but a couple stand out. The first recovery of a CH-21 near Ben Cat was by far the most difficult, mainly because of lack of experience. A lot had to be learned, not only in the technique of preparing the downed aircraft but also in improvising with the equipment on hand. It was a difficult recovery, taking several days and many tries to get it out of the waist deep water, but a successful one.

Then there was the U-6A that was carried internally — who said it wouldn't fit! So does an O-1A. The experience grew as the list grew—UH-1s, CH-34s, T-28s, AD-6s, OV-1s, CV-2s — and she even transported a 30-foot well drilling tower.

Naturally, not all recoveries were completely successful. The first UH-1B that was dropped was minus a tail boom. It spun beneath the CH-37 until it twisted the sling apart and dropped 300 feet. The load was recovered on the second try, though, internally! Overall, however, the successes outnumbered the failures 10 to 1, and the BUF proved her worth before being put out to pasture.

The BUF has had a number of "firsts" to her credit. It has already been mentioned that she was the first recovery aircraft in Vietnam, the first aircraft to undergo the 1,000 hour logistical evaluation, and the first helicopter to be considered in the medium helicopter class. At the time she was produced, she was the largest helicopter in the world, and still is the largest helicopter with reciprocating engines. She was the first and still is the only helicopter in the world with twin reciprocating engines, and has held both the world's speed and altitude record. The BUF can be credited with one of the best safety records of any helicopter in the Army inventory, and this is better than a first.

In the ten years the BUF has been on the scene she has had a colorful career, and made many friends. Now that she is being transferred to the National Guard it seems appropriate to peruse her past and say bye, bye, BUF!

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DATS'A GOOD'A PIZZA

THE HEAVILY-LADEN Huey helicopter dipped into the rough jungle clearing. It carried the evening meal for several grimy members of the 1st Cavalry Division (Airmobile). Two 15-gallon pots, sealed with green tape and labeled "Charlie Pizza," were unloaded. As the disbelieving soldiers watched, a sergeant opened the lid and passed out steaming pepperoni pizzas to grateful recipients at this Vietnam outpost, only a few miles from the Cambodian border.

These were part of some 6,000 frozen pies flown halfway around the world as the gift of a food center in Columbus, Georgia. A Columbus resident footed the bill for shipment to Corpus Christi, Texas, where an Air Force C-124 picked it up and rushed it across the Pacific to Saigon. In Vietnam the Army Hueys took over the mobile kitchen role, delivering the piping hot pizzas to farflung points, where the troops downed them without a trace.